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TABLE OF CONTENTS

Cancer of the Breast. F. J. Kirby, Baltimore, Md. 559

Discussed by Frank K. Boland, Atlanta, Ga.; M. Pinson Neal, Columbia, Mo.; Frank P. Strickler, Louisville, Ky.; Edward T. Newell, Chattanooga, Tenn.; F. Webb Griffith, Asheville, N. C.; J. A. Mitchell, Tullahoma, Tennessee.

Cesarean Section: A Study of Twenty Years' Experience. Percy W. Toombs, Memphis, Tenn. 566

Discussed by W. R. Cooke, Galveston, Tex.; W. E. Levy, New Orleans, La.; Joseph E. Green, Laurel, Miss.; James R. McCord, Atlanta, Ga.; S. B. Hinkle, Little Rock, Ark.; C. W. Karraker, Louisville, Ky.

The Treatment of Empyema in Small Children. W. Roger Moore, St. Joseph, Mo. 574

Discussed by R. R. Roberts, New Orleans, La.; J. A. Danna, New Orleans, La.; L. R. Debuys, New Orleans, La.; Oliver W. Hill, Knoxville, Tenn.; Robert A. Strong, New Orleans, La.; Alexis F. Hartmann, St. Louis, Missouri.

Pathological Changes During the Early Stages of Vitamin A Deficiency in the Albino Rat. Harvey S. Thatcher and Barnett Sure, Little Rock, Ark. 581

Discussed by Martha A. Wood, Houston, Tex.; J. A. McIntosh, Memphis, Tenn.

Cytological Examination of the Nasal Smear in the Differential Diagnosis of Allergy and Infection. I. S. Kahn and B. F. Stout, San Antonio, Tex. 582

Discussed by J. A. McIntosh, Memphis, Tenn.; N. F. Thiberge, New Orleans, La.; B. G. Efron, New Orleans, La.; Emmerich von Haam, New Orleans, La.; Charles W. Duval, New Orleans, La.

Continued on Next Page

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TABLE OF CONTENTS—Concluded

Chorioepithelioma and Hydatidiform Mole: Report of Four Cases. B. T. Beasley, Atlanta, Ga. ... 585

Discussed by John C. Culley, Oxford, Miss.; Gilbert F. Douglas, Birmingham, Ala.; Emil Novak, Baltimore, Md.

The Treatment of Cardiac Dyspnea. T. R. Harrison, Nashville, Tenn. ... 591

X-Ray Examination of the Heart in Left Auricular Enlargement. Franklin B. Bogart, Chattanooga, Tenn. ... 596

Discussed by C. H. Heacock, Memphis, Tenn.; Harry Hillstrom, Nashville, Tenn.

The Offensive and Defensive Reactions in Acute Infections of a Mucous Membrane. Harvey J. Howard, St. Louis, Mo. ... 602

Discussed by John O. McReynolds, Dallas, Tex.; Charles A. Bahn, New Orleans, La.; Dunbar Roy, Atlanta, Ga.

Ptosis and Torsion of the Gall-Bladder. Wm. R. Meeker, Mobile, Ala., and J. O. Lisenby, Atmore, Ala. ... 609

Discussed by Edwin P. Lehmann, University, Virginia

The Blood Picture in Sickle Cell Anemia. L. W. Diggs, Memphis, Tennessee ... 615

Discussed by V. P. Sydenstricker, Augusta, Ga.; Martha A. Wood, Houston, Tex.; Harry C. Schmeisser, Memphis, Tenn.

Contact Dermatitis and Eczema With Report of Nine Cases. Herbert J. Rinkel, Oklahoma City, Okla. ... 621

Discussed by M. F. Engman, Jr., St. Louis, Mo.; Andrew L. Glaze, Birmingham, Ala.

Personality Pathology. Stewart R. Roberts, Atlanta, Ga. ... 628

Discussed by W. W. Young, Atlanta, Ga.

Recurrent Affective States: Their Differentiation From Psychoneuroses. Leslie B. Hohman, Baltimore, Md. ... 635

Discussed by A. L. Skoog, Kansas City, Mo.; R. Finley Gayle, Jr., Richmond, Va.; J. J. Gable, Norman, Okla.; Temple Fay, Philadelphia, Pa.

Colossal Emphysema of Upper Extremities: Foreign Body in the Lungs. E. W. Carpenter, Greenville, S. C. ... 640

A Receptacle For Obtaining Specimens of Urine From Infants and Untrained Children. Howard Hailey, Atlanta, Ga. ... 640

SYMPOSIUM ON MALARIA, Part 2

Observations on Malaria Incidence in Some Unsanitated River Villages in the Republic of Panama, With Special Reference to Proposed Construction Projects in the Canal Zone. H. C. Clark and W. H. W. Komp, Ancon, Canal Zone ... 642

Therapy of Chronic Malarial Splenomegaly. Maurizio Ascoli and Ugo Diliberto, Palermo, Italy. ... 647

Malaria Control Work in West Africa. M. A. Barber, New York, N. Y. ... 649

Discussed by Henry Hanson, Jacksonville, Florida.

Malaria Control and Anopheles Control Measures of the Past and Future. J. A. LePrince, Memphis, Tennessee ... 651

Discussed by H. G. Tuggle, Memphis, Tenn.; Victor G. Heiser, New York, N. Y.; L. L. Williams, Jr., Washington, D. C.

Malaria in Mississippi and Adjacent States. Frederick L. Hoffman, Wellesley Hills, Mass. ... 657

Discussed by Felix J. Underwood, Jackson, Mississippi.

Screening in Sharkey County. A. K. Barrier, Rolling Fork, Miss. ... 662

Discussed by Geo. E. Riley, Jackson, Miss.

Public Health a Business Proposition. Henry W. Stanley, Dallas, Tex. ... 665

Discussed by J. A. LePrince, Memphis, Tenn.; J. C. Anderson, Austin, Tex.; Francisco Banda, New Orleans, La.; C. P. Coogle, Memphis, Tenn.

EDITORIALS ... 672

New Journals in the South.
Disinfection of Minor Wounds and of the Unbroken Skin.
Gleanings from Recent Journals.

BOOK REVIEWS ... 675

OFFICERS, Southern Medical Association and Jefferson County Medical Society ... 676

SOUTHERN MEDICAL NEWS ... 677

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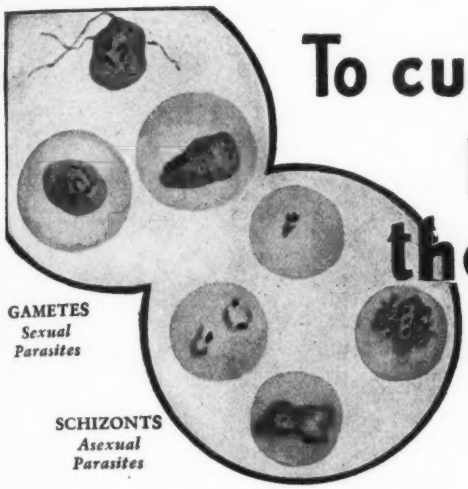

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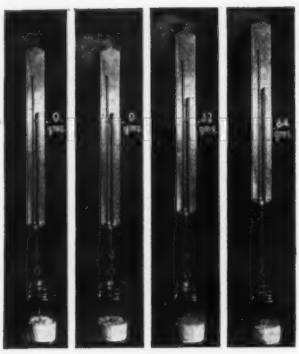

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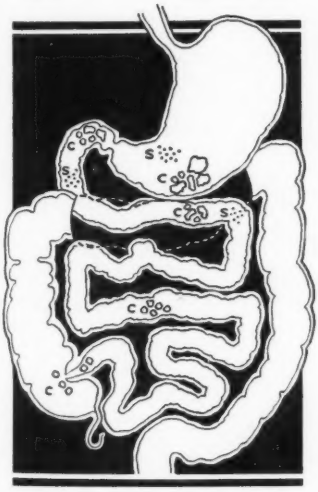

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[1] London & Polowzowa: Zeitschr. f. physiol. Chem. 1906, XLIX, 328.

[2] Marriott: Infant Nutrition, pg. 81.

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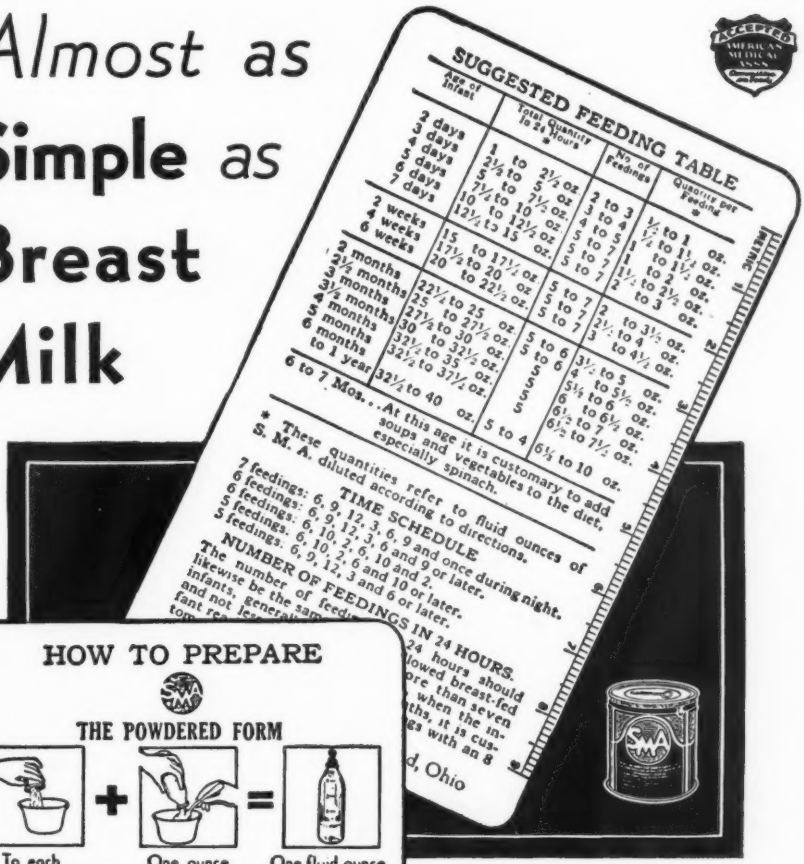
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SUGGESTED FEEDING TABLE
Age of Infant
Total Quantity in 24 Hours *
No. of Feedings
Quantity per Feeding *
2 days 1 to 2½ oz. 2 to 3 ½ to 1 oz.
3 days 2½ to 5 oz. 3 to 4 1 to 1½ oz.
4 days 5 to 7½ oz. 5 to 7 1½ to 2 oz.
5 days 7½ to 10 oz. 5 to 7 2 to 2½ oz.
6 days 10 to 12½ oz. 5 to 7 2½ to 3 oz.
7 days 12½ to 15 oz.
2 weeks 15 5 to 7 2 to 3½ oz.
4 weeks 17½ to 20 oz. 5 to 7 3 to 4 oz.
6 weeks 20 to 22½ oz. 5 to 7 3½ to 4½ oz.
2 months 22½ to 25 oz. 5 to 6 3½ to 5 oz.
2½ months 25 to 27½ oz. 5 to 6 4 to 5½ oz.
3 months 27½ to 30 oz. 5 to 6 5 to 6 oz.
3½ months 30 to 32½ oz. 5 to 6 5½ to 6½ oz.
4 months 32½ to 35 oz. 5 to 6 6 to 7 oz.
5 months 32½ to 37½ oz. 5 to 6 6½ to 7½ oz.
6 months to 1 year 32½ to 40 oz. 5 to 4 6½ to 10 oz.
6 to 7 Mos. . . At this age it is customary to add soups and vegetables to the diet, especially spinach.
* These quantities refer to fluid ounces of S. M. A. diluted according to directions.
TIME SCHEDULE
7 feedings: 6, 9, 12, 3, 6, 9 and once during night.
6 feedings: 6, 9, 12, 3, 6, 9 and 9 or later.
6 feedings: 6, 10, 2, 6, 10 and 2.
5 feedings: 6, 10, 2, 6, 10 and 10 or later.
5 feedings: 6, 9, 12, 3 and 6 or later.
NUMBER OF FEEDINGS IN 24 HOURS.
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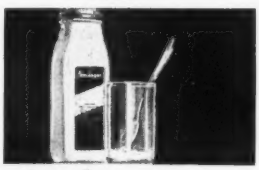

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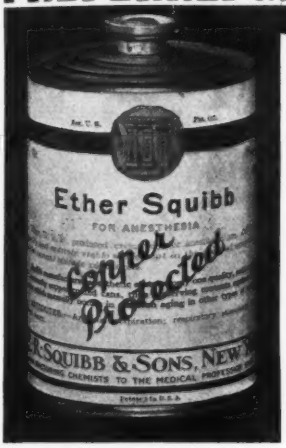

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By using a 20° anode with an elongated focal spot, as introduced by Benson* in 1916, a smaller projected focus has been made possible, thereby offering a choice of increased film detail or greater speed of radiography.

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X-Ray Protection

Smaller Focal Spots

Higher Energy Ratings

Replacement Economy

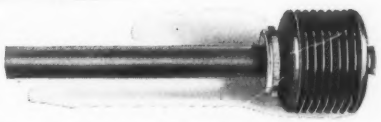
Air and Water-Cooled Radiators Interchangeable

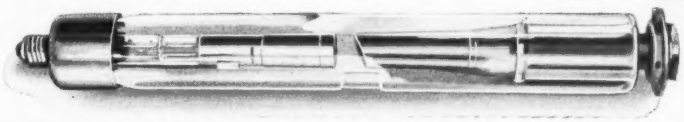
Extraordinary Freedom from Risk of Puncture

Utmost Reliability Due to Practical Design of Vacuum Unit

*U.S. Patent No. 1,174,044, granted March 7, 1916. Assigned to General Electric X-Ray Corporation in October, 1931.

Above: "XP" Coolidge Tube enclosed in protective cover, with water-cooled radiator.
Right: Air-Cooled Radiator, which is interchangeable with above water-cooled radiator.
Below: The Coolidge Tube, as it appears when supplied as a replacement unit.





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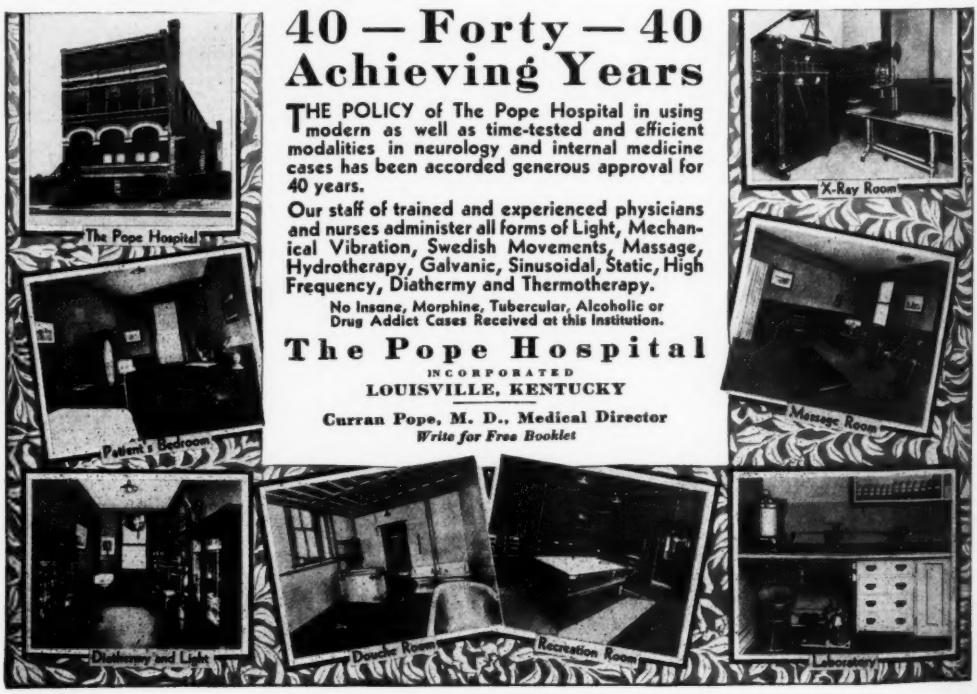

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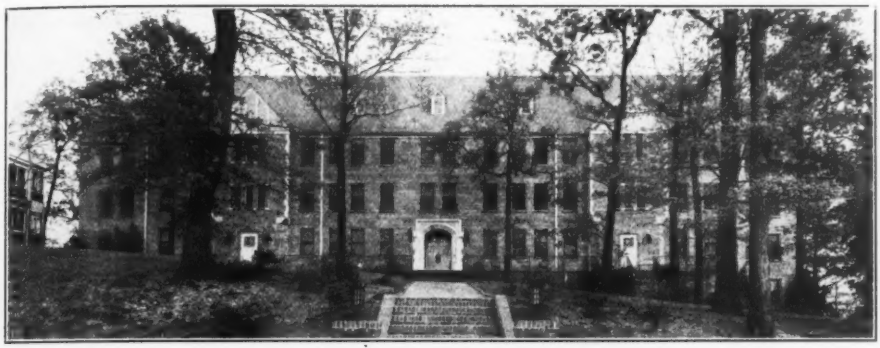

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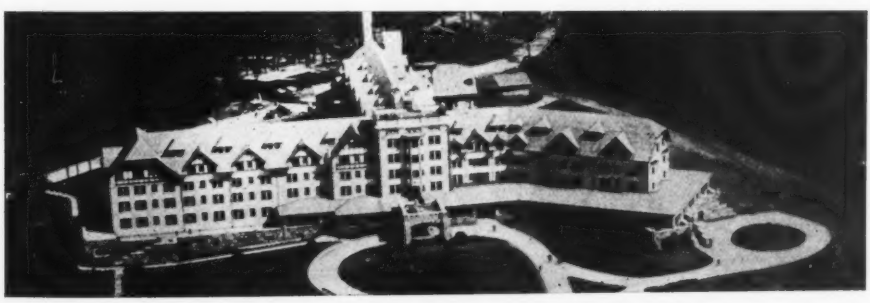

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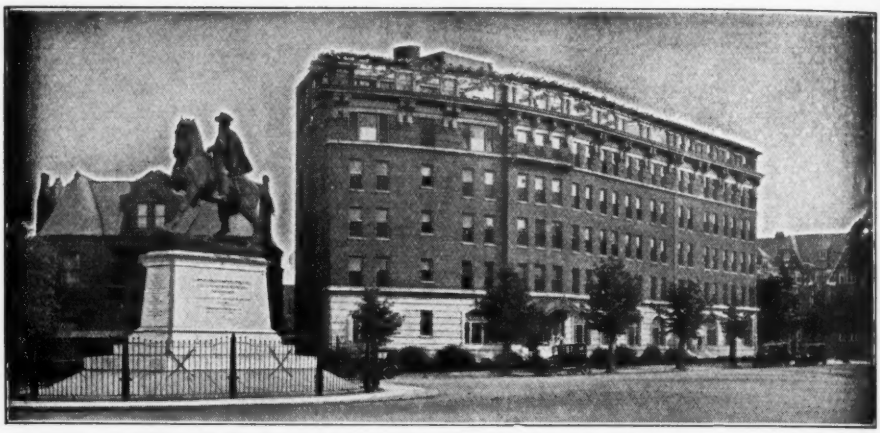

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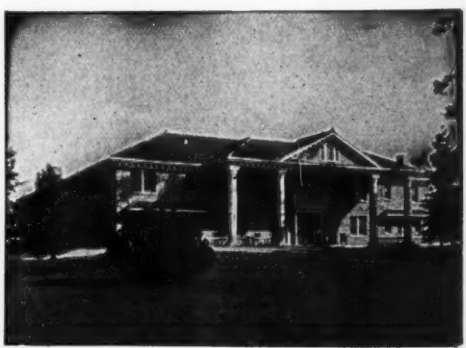

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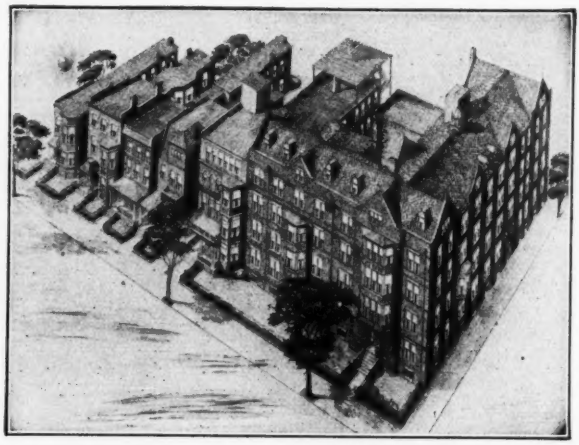

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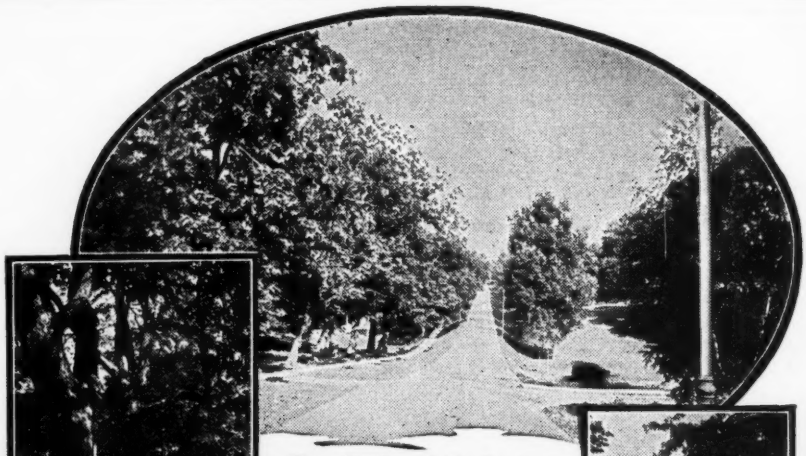

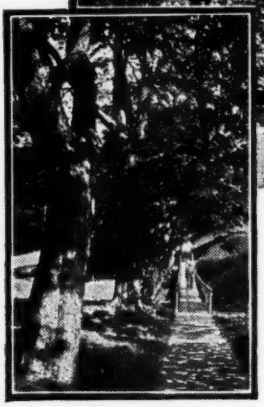

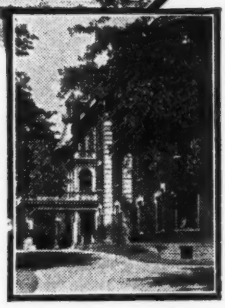

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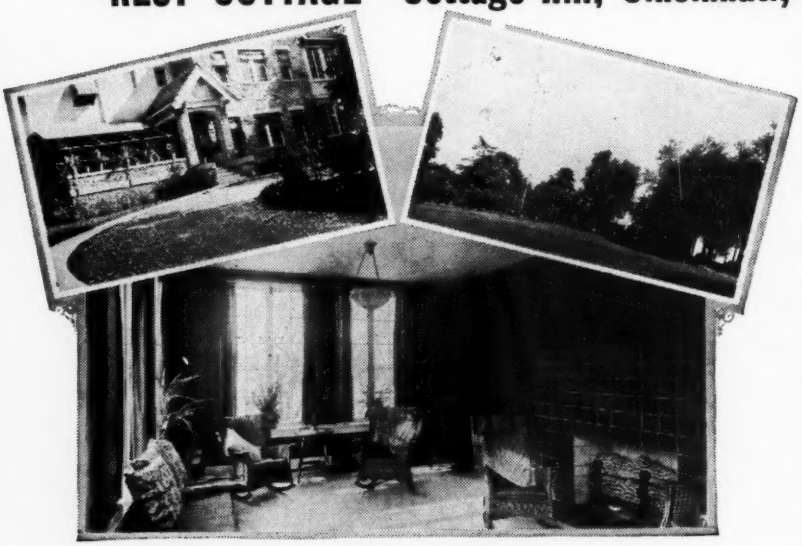

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CANCER OF THE BREAST*

By F. J. KIRBY, M.D., F.A.C.S.,
Baltimore, Md.

The story of malignant disease is one of the saddest chapters in the whole category of surgery, and cancer of the breast stands out prominently as a vivid example.

For many years ideas and theories have been expounded from time to time as to the causative factors in the production of cancer; but these have been largely speculative, consequently short-lived; and we find ourselves today still far from a universally accepted and harmonious agreement as to the etiology, notwithstanding the fact that chronic irritation appears as a logical explanation of cell proliferation.

Many[1] years before the appearance of Cohnheim's work, observations had been accumulating to show that tumors were in some way related to embryological growth of tissue.

Lobstein,[2] in 1829, likened the growth of a tumor to that of embryological tissue, and conceived that neoplastic growths had lost control of the organism.

In 1874, Durante[3] clearly stated the doctrine that all tumors arise from embryological groups of cells. Thiersch[4] found in the weakening of the stroma of the involuting breast a relief of tension, capable of releasing the formative tendencies of gland cells, with their longer span of vital activity. The decay of connective tissue he regarded as senile atrophy, and growth of cells as degenerative proliferation.

Other theories, as heredity, syphilis, tuberculosis, the parasitic microorganisms, as the coccidiae, the Plimmer, and Gaylord bodies, blastomycetes, trauma, have all been suggested. Billroth's dictum,[5] without previous chronic inflammation cancer does not exist, is so generally true as to establish the great significance of chronic irritation as a factor in tumor origin.

We may define cancer as a neoplasm, a new growth, growing independently in the body, serving no useful purpose, conforming to none of the physiological laws of the body, and tending to the destruction of the individual. It probably is the biological activity of malignant disease, then, that has made it difficult, in fact impossible up to this time, definitely to discern the real cause bringing about the production of cancer in susceptible individuals and its appearance in varied locations in members of the same family.

However, irritation, especially as Billroth stated, "chronic irritation" is a very prominent factor in starting cell proliferation. Ewing[6] states: the effective causation of mammary cancer is to be traced in the combination of several predisposing, contributing, and exciting factors.

There is ground for assuming that many individuals are predisposed to mammary neoplasms. Simple glandular hypertrophy in early life, developmental anomalies leading to fibroadenoma, and sequestration of breast tissue, may, under favorable conditions, be an important factor in precipitating malignant tumor growth in later life.

Ewing[7] says by far the most important element in the tissue predisposition is chronic productive mastitis. The great majority of cancers develop in tissue altered by reactive inflammatory processes.

Ewing[8] says also that stagnation of milk may be the central factor in the production of mammary cancer. This is indicated by Bagge's success in the production of mammary cancer in mice.

In animals breeding rapidly he caused marked distention of ducts and acini, and frequently carcinoma, by withdrawing the young or ligating the ducts. Ducts distended with inspissated secretions are rarely missing in the outlying breast tissue in carcinoma, and not infrequently one finds this stagnation only in the zone leading to the carcinoma.[8]

Since stagnation and decomposition of milk is a concrete and largely preventable matter, attention may well be directed to this probable factor in the effort to prevent mammary cancer. Lehman[9] offers statistical evidence that nursing is a prophylactic against mammary cancer.

Adair[10] secured a normal lactation history in only 8 per cent of 200 cases of mammary cancer. In some cases the disease developed in one breast, which had not been nursed, owing to some disease of the nipple.

It is the experience of some observers that a breast

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which is the seat of malignant disease does not lactate.

Carcinoma forms from 82 to 84 per cent of all mammary tumors (Delbet).

Hereditary influence plays a small part in the history of cancer of the breast, being variously estimated by different observers at from 2 to 5 per cent. The left breast appears to be affected a little more than the right.

History of traumatism was obtained in about 5 per cent of our cases, the tumor being discovered by the patient between three and four months after an injury.

Ewing[11] states that the essential relation of trauma to mammary cancer is still unproved, but injury not infrequently accelerates growth.

Crile,[12] in an analysis of 1,347 cases of malignant tumor of the breast, states that a definite relation may exist between trauma and cancer of the breast, is indicated by various published statistics as those of Hoffman. Hoffman, in a series of 314 cases of cancer of the breast, considered trauma the etiological factor in 14 per cent.

In unilateral chronic mastitis cancer may develop. In bilateral chronic mastitis cancer never develops (G. W. Crile).

Ewing[13] further states that not until the anatomical structure and histogenesis of these tumors is more fully understood can any significant knowledge be obtained of their etiology, prognosis, and the value of treatment.

In other words, it will be only when knowledge is obtained of the histology, biology, morphology, and susceptible tendency of cells to influences exerted upon them. When it happens that knowledge is acquired of individual cells, their susceptibility to the influence of certain factors producing changes in the cells themselves and the pathological and chemical changes taking place in them as the result, that we will arrive at a true knowledge of the cell proliferation which produces cancer.

Ewing[14] considers cancers of the breast under the following heads:

(1) Adenocarcinoma, arising chiefly in cysts of ducts or sweat glands.

(2) Duct carcinoma, arising from the lining cells of ducts.

(3) Acinar carcinoma, arising from the epithelium of the acini. He feels that the grouping of these tumors at medullary, scirrhus and solid carcinoma, in no manner illuminates the subject.

Probably not, from the standpoint of the pathologist, in differentiating histologically the type arrangement of cells for the establishment of a finer anatomical study. But for the surgeon it is the early accurate diagnosis (which the surgeon should be able to make from the microscopical picture) and early treatment which are essential to the welfare and future of the patient.

Insidious in its onset, like a thief in the night, malignant disease makes its appearance.

Cancer of the breast is not a disease of advanced life, but comes on during the most useful and valuable period of a woman's existence.

Harrington[15] says that no period after puberty is immune to cancer of the breast.

The greatest incidence is between forty and fifty years and between fifty and sixty years; in other words, 65 per cent of cases occurred between forty and sixty years of age. Of 2,457 cases studied at the Mayo Clinic, 52.5 per cent occurred in the left breast and 47.5 per cent in the right breast.

The most common site of the tumor was the upper and outer quadrant of the breast.

M. Ducuing[16] reports that of 106 cases analyzed, 37 per cent occurred in the upper and outer quadrant, and in 77 per cent of his series the disease occurred between 40 and 60 years of age. This agrees very well with the experience of most of us.

Pain is not a symptom of cancer; especially is this true in the breast. Women become so accustomed to swelling, heat, and some soreness in the breasts at menstrual time, or a sense of drawing or tightness, and sometimes darting pains through the breast, that they pay little attention to them. Pain comes on only late in the disease and is due to metastases, generally, to some neighboring part or organ, such as the nervous system, the pleura, the liver, or bony skeleton. Cases of cancer of the breast have been reported as early as twelve years of age.

There is no definite, positive early symptom of cancer of the breast before the appearance of a lump. We can further state that the majority of cases of cancer of the breast are inoperable from the standpoint of surgical cure when we see them.

The average duration of the tumor, when patients were presented for operation in our series, was eighteen and one-half months. Why this delay? Because many of these lumps are found accidentally by the patient, and since they cause no special pain or discomfort in the early stage the surgeon is not consulted. Again, patients have stated that they were told by their physician that as long as the lump gave no pain they should let it alone.

Benign tumors frequently cause pain and soreness.

All physicians should tell all their female patients and all women whom they can advise, to examine their breasts on the first day of every month, and if they discover a lump, to go at once to their physician and insist on a surgical consultation. We should then see all our cases

of cancer when the growth was not more than four or five weeks old, and could then show a very much higher percentage of cures. A single hard nodule in the breast of a woman of sixty years or over, is scirrhus carcinoma. A discharge from the nipple, even a serous or bloody discharge, is not necessarily a symptom of cancer, but means, if bloody, an intracystic papilloma.

Some authors claim that a discharge from the nipple gives no information as to the character of the growth.

Adair[17] says a dark bloody discharge from the nipple always means a duct carcinoma. For proper examination of the breast, the patient should be lying on her back with the arms extended, the hands resting on her head.

The hands are placed on the breasts, allowing the nipple to protrude between the fingers, then the breasts are gently pressed, and they can be easily palpated between the chest wall and the fingers of the hand. Any abnormality or tumor growth can be easily and readily detected. Whether it is movable or adherent, smooth, fluctuating, or a hard immovable lump, should be determined. A breast the seat of a cancer is on a higher level than the breast on the opposite side.

There is the presence of a hard nodule which is not freely movable in the breast. There is atrophy of the subcutaneous fat over the tumor, and there are adhesions to the overlying skin, with retraction of the nipple. In many instances dimpling of the skin, and a condition like pigskin over the tumor are seen.

This is due to a perilymphangitis causing contraction of the connective tissue and lymphatics in the breast. In stout women and women with large hypertrophied breasts, the original tumor may not be detected on examination, and the patient presents herself with a tumor along the outer border of the greater pectoral muscle in the axillary prolongation of the breast; the so-called axillary tail of Sir Astley Cooper.

If these breasts are picked up by placing the hand underneath the breast and raising it, a depression like a saucer turned upside down will present, and the hard nodule will be detected by the fingers about the center of this upturned saucer-like depression.

Cancer of the breast in a pregnant woman grows rapidly after the termination of pregnancy, but that pregnancy itself is an inciting factor in causing cancer of the breast there is no definite assurance or evidence.

Cancer of the breast in women over 60 years of age grows slowly, and metastasizes slowly. Paget's disease of the nipple is an acute eczema of the nipple, an areola. According to Paget:

"This red, moist, itchy eruption may extend beyond the nipple, the areola, and involve the skin over the breast; and if not cured it is liable in two or three years to be associated with carcinoma.

"If the eruption is dry and scaly like a psoriasis, scirrhus carcinoma is always associated."

There is quite a difference of opinion among the various investigators as to this condition.

PROGNOSIS

Haggard and Floyd[18] state that it is estimated that over five thousand women in the United States die annually of cancer of the breast, and that early surgery will entirely cure from 80 to 90 per cent.

Deaver[19] says if the axilla is not involved 80 per cent have cures after operation; and reports 45.7 per cent of five to ten year cures in 111 cases.

Harrington[20] says the surgical treatment of malignant disease of the mammary gland is based on the theory that at the onset the disease is localized to the breast, and becomes disseminated through the body by lymphatic vessels, or by direct transmission.

The rapidity with which this takes place depends on the degree of malignancy. If this conception is true, it emphasizes the importance of early diagnosis and treatment.

The prognosis, then, in cancer of the breast depends largely on metastases, in addition to early diagnosis and complete operation.

Harrington[21] reports that in a series of 1,859 cases of cancer of the breast operated upon at the Mayo Clinic, from 1910 to 1923, the best results were obtained when no lymphatic involvement was found, and radical operation was done.

In a group without lymphatic involvement 80 per cent were living after three years, 67 per cent were living after five years and 53 per cent were living after ten years.

He further says that it is unfortunate that the cases without lymphatic involvement comprise only 34 per cent of the total number.

In the remaining 66 per cent of these 1,859 cases, metastases were found in the axillary nodes at the time of operation. Fifty-nine per cent had lymphatic involvement, and of these cases 39.23 per cent lived three years, 24.27 per cent lived five years, and 13.37 per cent lived ten years.

With roentgen ray, 41.31 per cent lived three years, 27.58 per cent lived five years, and 8.24 per cent ten years.

Twenty-eight cases of carcinoma developed in lactating breasts. In 7 the tumor was present before pregnancy.

Nineteen of these cases lived less than one year, and

five less than two years. Of 4 patients who lived more than two years after operation, the children did not nurse from the affected breast.

Patients with metastases treated by x-ray lived two and one-half years.

Patients with metastases not treated by x-ray lived three and one-fourth years.

Results were not improved in cases in which the roentgen ray was used as an auxiliary to surgical treatment. Crile[22] reports that of 1,347 cases of cancer of the breast which had radical operation, 38 per cent were living after five years, and that 10 per cent more cases may survive five years than of those not radiated.

Radiation has not materially benefited any of our cases, especially those in early active life, under forty years of age. In fact, in a small number it seemed to increase the rapidity of recurrence and extension of the disease.

It has had no effect on internal metastases.

In older persons, sixty years of age and over, it did materially lessen the growth when it was used prior to operation, and brought about destruction of cancer cells in involved lymph nodes, as shown under the microscope. There is a cone-shaped triangular space, or fossa, formed by the junction of the clavicle and the first rib with the sternum. The apex of the cone is directed upward and inward. I have found hard shot-like nodules of cancer in this fossa, where there were no palpable or involved lymph nodes in the axilla.

And since finding them here in this area, with and without finding involved lymph nodes in the axilla or in Morenheim's fossa, I always invade this space first and work from here outward toward the axilla, under the clavicle, along the axillary vessels to the axilla, then dissecting out the axilla, removing the fat, fascia, lymph nodes and lymphatic structures with both pectoral muscles, fascia, fat, and lymphatics over the thorax with the breast, all in one piece, thus cutting off the lymph vessels in the beginning, as far removed from the tumor as possible.

Deaver[23] says that the mortality statistics of breast surgery have remained unsatisfactory, not so much on account of immediate deaths, but because of failure to cure. Of 178 radical cases at the Lakenau Hospital, 14 or 8.5 per cent are living and well after five years.

Forty-five per cent of cases of cancer of the breast die of metastases from one month to three years after operation, and 50 per cent have edema of the arm, whether or not they have metastases or recurrence.

Handley's centrifugal lymph permeation is generally accepted as the most rational explanation as yet offered for regional dissemination of cancer, as well as for the large percentage of the postoperative local recurrences.

Adair[24] believes that surgery in the best clinics accomplishes 35 to 38 per cent of five-year cures, and the use of radiation has not materially improved this. Bevan[25] says that early cases where the lesion is limited to a block of tissue and no axillary lymph nodes are found involved, will give after radical operation 75 to 80 per cent of permanent cures.

When axillary lymph nodes are involved, the percentage of permanent cures drops to 10. He further states that we are probably curing today in all the best clinics 30 to 35 per cent of our breast carcinomas. Schnitzler[26] says that with complete operation on very early cases, the percentage of cures should be 60.

TREATMENT

As it stands today, radical operation for cancer of the breast is the treatment of choice, and gives the best prognosis for the patient.

The operation which removes all lymphatics and lymph nodes from the cone-shaped fossa I have described, lymphatics and fat along the great vessels under the clavicle, including Morenheim's fossa, and the axillary space, the lymphatics, fat fascia and both pectoral muscles, the entire breast and overlying skin, well outside the tumor, all in one piece. Such an operation divides the lymph channels and vessels farthest away from the breast, thus minimizing the danger of dissemination of cancer cells during manipulation, and is the radical operation for mammary carcinoma.

Rodman[27] says that Thomas Moore of England (*Transactions Royal Medical and Chirurgical Society,* Vol. I, 1867), one time surgeon to the Middlesex Hospital, was the first to show in 1867 that in the beginning cancer is strictly a localized process. To him belongs the credit of first laying down certain of the principles of modern breast amputation for carcinoma.

In a paper entitled, "On the Influence of Inadequate Operations on the Theory of Cancer," he insisted that the entire breast, with skin, fat, pectoral fascia, pectoral muscles, and enlarged lymphatic glands, should be removed in such a manner as not to cut into or even reveal the growth; the diseased structures being removed *en masse.*

Radium.—Soiland[28] believes that a certain number of cases of cancer of the breast can be relieved of their disease for five years or more by radiation alone.

For a number of years he has been convinced that early radiation of all cancers of the breast, in all stages, would make treatment more effective, and that radiation should be used before operation instead of after operation, and the endotherm or radio knife used in operating.

It was the Canti film, at Cambridge, which

showed the actual death of cancer cells under radiation, thus verifying a claim for years that radiation treatment kills cancer cells.

He further states that no two radiologists have the same viewpoint as to what constitutes a cancer dose of radiation energy. Geoffrey Keynes[29] buries radium needles beneath the breast, beneath the pectoral muscles, in the axilla, on the costocoracoid membrane, above the clavicle, and in the upper three or four intercostal spaces, the needles being so placed that they are in two groups, those in relation to the mammary gland, and those in relation to lymphatic drainage.

The optimum time is 168 hours, that is, seven days. In other words, he advocates prolonged exposure to relatively small doses of radium needles placed deep in the mammary gland, as the needles if placed in the growth may cause necrosis.

He claims good results in external metastases, not in internal metastases.

N. Treves,[30] for edema of the arm, suggests the Kondoleon operation, with incisions from the elbow to the wrist on the lateral and mesial sides. The incisions are carried down to the fascia, and a strip of the fascia is excised.

Handley's lymphangioplasty consists in introducing subcutaneous continuous black silk from the wrist to the axilla through small puncture-like incisions. Black silk No. 2 is introduced by means of a long probe.

Under no circumstances should the tumor be cut into for the purpose of making a diagnosis. If in doubt it is much safer for the patient to remove the breast.

Should it become necessary at the time of operation for a speedy diagnosis, the tumor can be removed with a large area of breast tissue and skin; and if found malignant, the radical operation may be performed then and there.

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DISCUSSION (*Abstract*)

Dr. Frank K. Boland, Atlanta, Ga.—I am very much discouraged as a result of our campaign to educate the public, especially women, in regard to early diagnosis of cancer of the breast. Every time a campaign is started, and someone makes a talk before a parent-teachers' association, I find a great many women coming to the office, none of whom has cancer of the breast. It seems to me that the cases of real cancer of the breast are just as hard to get at as ever. Sometimes I believe our public cancer talks do almost as much harm as good, since many women thereby develop cancer-phobia and become nervous wrecks.

The second point I wish to make is to beware of operating upon inflamed cancer, also called carcinoma mastitoides, first described by Volkmann in 1875.

Quite recently, I regret to say, I operated upon a case in which I thought the inflammatory condition had been relieved. The patient had cancer of the breast with some edema around the nipple. Operation was postponed, and all signs of inflammation had disappeared at the time of operation. A gangrenous condition appeared in the wound and disappeared, but about ten days later the patient developed pneumonia and died. I believe we should always leave those cases alone.

The third point I wish to make is in regard to treatment of cases operated upon for the last time. Usually they go back home to the family physician, who has to see them through their last weeks or months of illness. The surgeon should attend such cases to the bitter end.

I hesitate to mention the treatment I have tried, because it smacks of quackery. However, we can learn from the quacks. The treatment is the use of some form of non-specific foreign protein. Lately, I have used one of the sterilized skim-milk preparations, given daily, or every other day, or sometimes three times a week.

The first case I had was spectacular. The patient was a young woman about thirty years old, who had been operated upon seven times and finally came to her death bed, temperature 101°, pulse 120, could not sleep, and with multiple metastases. She looked as if she were going to die in a few days. She had heard of a certain well-known cancer cure. At the request of her husband, I wired for the cure, being willing to do anything to satisfy the dying patient. The cancer-cure people were shrewd, found it was a hopeless case and would not send the treatment. So the husband asked me to give the patient something and tell her it was a cancer cure. I gave her 1 c.c. of an advertised foreign protein, and

to my amazement she became a great deal better. She slept all night without morphine, and the next morning her temperature and pulse were normal. Her appetite improved. She was able to go out, and lived four months. We continued to give her 1 c.c. of the foreign protein daily. Since then I have used the same treatment in a good many cases.

I think a treatment of this kind is good as a last resort to make the patient's end more peaceful.

W. J. Mayo says the best we can do today is to increase the resistance against cancer. In several cases the leucocyte count rose 2000 to 3000 after an injection of one of these forms of proteins.

Dr. M. Pinson Neal, Columbia, Mo.—As a teaching pathologist who finds time to serve as a consultant, as a tissue diagnostician, and on a number of teams striving for the control of malignant neoplasms, I would like to present a few points concerning tumors of the male breast. The essayist rather apologized for bringing his material before this Section. His apology, but not his message, is out of place. The breast tumor problem is just as important from the industrial standpoint as from any other. It is true that tumors do not constitute the acute diseases nor demand the emergency service that the industrial accidents ordinarily demand, but from the standpoint of prevention, early recognition, and being sought for on physical examination, they are of much importance.

In a recent analysis of 9,279 breast tumors, I have had occasion personally to study 308 tumors that occurred in the breasts of men. Ordinarily, we as physicians erroneously look upon the male breast as a harmless rudiment. The first cancer of the male breast that I diagnosed was in a day laborer. His physician, upon receiving my report, wired me at once, "You must be mistaken. The breast upon which you made the report of carcinoma was from a Mr. Jones, a man, and not a woman." If this impression exists in other medical minds, then there is something wrong in our knowledge of the male breast and something lacking in our program aimed at the control of cancer.

For the past six years I have gone extensively into the question of breast tumors in males. Of the 308 male breast tumors, 50 were carcinomas, and of this number 8 were of skin origin and 42 were of duct or gland cell origin. In 1891 there had not been recorded a single case of carcinoma arising in the skin of the breast of woman. They are even now among the rare tumors of that female organ. Why, then, do we find 8 epitheliomas in 50 carcinomas of the breast in man? From my observation it is a question of irritation and largely that induced by occupational appliances. This is an important factor, and one that must be reckoned with in the prevention of these growths.

Sarcomas constituted 10 of my 308 cases of male breast tumors. My statistics revealed 10 sarcomas to 50 carcinomas in the male breast. Carcinomas therefore occurred in the male breast only 5 times more often than did sarcomas. In the female breast my group showed 79 carcinomas to each sarcoma. Therefore it is seen that as compared to the number of carcinomas in the breasts of the two sexes, sarcomas occurred almost 16 times proportionately more often in the male breast than in that of the female. The question may rightfully be asked, why this marked disproportion? It is because we have a large amount of connective tissue in the male breast, and a scant amount of epithelial, and again from the fact that single and severe traumatic injuries and irritations tend to incite the malignant connective tissue growths rather than those of epithelial type.

Of the 308 male breasts, there were 60 cases of malignant neoplasms, 105 cases of benign tumors, and 143 cases of non-neoplastic lesions. Statements are common in the American literature that carcinoma is the most common disease of the male breast. This is not true for my group. The non-neoplastic lesions constituted 46.42 per cent of the diseases of the male breast, the benign tumors comprised 34.09 per cent and the malignant tumors, carcinomas and sarcomas combined made up only 19.48 per cent. This shows, then, that only one of 5 male breast lesions was found to be a malignant tumor.

It is of particular interest to note that in my group there were 50 cases of male breast carcinoma against 4,014 similar tumors of the female breast. This gives a proportion of one carcinoma in the male breast to 80 in the female. A further contrast shows that while carcinomas occurred only 5 times more often in the male breast than did sarcomas, in the female breast carcinomas were found 79 times more frequently than sarcomas.

I cannot refrain from calling to the attention of this group of surgeons the valuable program now being waged by the American College of Surgeons in its standardization program for hospitals and laboratories. Twenty years ago, the great majority of surgical specimens never reached the laboratory unless the patient was one of particular interest or a personal friend of his physician. Those specimens which did go to a laboratory often were held and improperly fixed before being submitted to a pathologist, or not too rarely they were sent to some man who was extremely busy in other fields, like teaching, and the report was delayed to the degree that it was of little help to the patient. The American College of Surgeons now requires that all surgical tissues be examined by a pathologist who is a specialist in his field, and has received recognition as such. For that reason, we are seeing and living through a change in statistics dealing with the diseases of man, and cancers in particular.

If there is one thing for which a medical group should be commended, it is the stand the American College of Surgeons has taken in bringing to the patient a better service and competent pathologic diagnoses, and to the profession better statistics upon which further studies may be based and from which all medical science will profit.

Dr. Frank P. Strickler, Louisville, Ky.—I want to report three cases of malignancy in the breast of males which were operated upon. None of these cases gave a history of malignancy in the family. All of these men while working sustained injuries to the breast. If we are on the lookout for these cases we shall see more of them.

Dr. Edward T. Newell, Chattanooga, Tenn.—The American Society for the Control of Cancer has done a very great work; but as Dr. Boland has said, it has scared some women greatly, some young women; and we have all had immediately after their campaigns which

have been put on in recent years women coming in to us with so-called lumps in the breast that were not lumps. But the work of this Society as a whole has been well worth while, because it has called to the attention of women the necessity of coming early to the surgeon, rather than, as Dr. Kirby has said, at the end of eighteen months in Maryland, seventeen months in Tennessee, and so on.

I understand in Massachusetts, where they have had more intensive cancer control lectures, that the average case comes earlier than in most of the states.

When a woman comes to you with a lump in her breast, oft-times it is so small that you are unable to find it, and while Dr. Kirby has detailed to you a very splendid method of investigation of breast neoplasms, I have found in some of my cases that it was necessary to have the patient direct me to the small tumor, which is deep down in the substance of the breast.

I believe it is a good service to your patients, if you do not think the tumor frankly malignant, or if you feel that it is non-malignant, to have the patient at short intervals report to you for repeated examinations. If the tumor, no matter how small, remains in the breast, and on her mind, it should be removed with the cautery. It is true it can be removed with the scalpel, but as Dr. Kirby says, it is much safer to cut wide of it with the cautery and remove it. If the tumor seems to be malignant, have the stage set so that you can do a radical operation of the breast at this time.

I am at variance with the Doctor in regard to the value of deep x-ray therapy. For about fifteen years, ever since the development of the deep therapy machine, we have been using it, not always before, but afterwards, and over a period of three years a technic which we have developed, which is not so intensive and frequent and with as much cross fire as some roentgenologists use. We feel that we have not done harm in any case, but have decreased our breast cancer mortality.

At a clinic held by Dr. Scott in Temple, Texas, when this Society last met in Dallas, I was made a convert to the removal of all malignancies with the cautery. Some of you may say that you cannot remove a breast as easily, as completely and as skillfully with the cautery as you can with the knife; but you will remember, you older men, how awkward gloves felt when we first put them on, and now we cannot work well without gloves. You men who operate with either hand know how easy it is now and how awkward it was at first.

Following the technic of Dr. Scott, since visiting his clinic, we have removed all of our breasts with the cautery. In addition, in the little fossa, high up under the coracoid process in front of the scapula, beautifully described by the essayist, we place 25 mg. of radium immediately following the radical operation. Twenty-five mg. are also placed beneath the lower angle of incision, both well screened with brass and with rubber.

The radium capsules are pulled every eight hours, three times. They are moved until they meet in the center of the wound, whence they are removed.

By using the cautery for operation; the introduction of the radium; deep therapy treatment, given preferably before, but if not, afterwards; and continuing this treatment over a period of three years, we have increased our cures. Our statistics also reveal that there has been quite an increase in cures in those cases which the lamented Murphy used to say, all returned where there was axillary involvement. We have several five-year cures.

Dr. F. Webb Griffith, Asheville, N. C.—Dr. Newell referred to the postoperative treatment with radium. About a year ago I spent considerable time on the Continent and in England; the one thing that struck me most forcibly was that in some of the hospitals, especially at the Westminster Hospital in London, cancers of the breast were treated routinely by radium. I do not refer to the inoperable cancers, but to nearly all of them that were admitted to the hospital. It was claimed that the results were equal to that obtained by surgery.

I asked, "How do you know that you are treating cancer, and not a fairly large number of benign lesions?" The reply was that all cases were submitted to at least two competent surgeons who pronounced them clinically malignant, and even if a benign case did occasionally get in by mistake, the statistics would not be greatly influenced. I could not quite bring myself to agree with them. I wonder if there is any man in this audience today who would be willing to have his wife treated for cancer of the breast purely and simply by radium. I have asked that question to several groups of medical men and so far have not found any physician who would.

Dr. J. A. Mitchell, Tullahoma, Tenn.—I wish to bring out the many things that cancer has in common with fungus infections. Both seem to thrive on tissue with lowered vitality, and they are usually made worse by irritation. In many cases they are apt to follow irritants or pressure on tissues. Cancer occurs more often in old people, and many cases among these are accompanied by a fungus infection on some parts of the body. Cancer and fungus infections have an odor very similar.

There are many types of fungus infection. So-called eczema in many cases is due to a fungus. The infection runs from the very mild, scaly eruption on the skin on through the weeping type to those cases where the skin becomes very hard. We occasionally see a fungus infection of the palm of the hands which is hard and resembles the bottom of a horse's foot.

I recall two cases of cancer on the inner side of the middle of the thigh, which evidently started from an infection of the toes. The older of the two, a man, had an infection of the toes, which was followed by a wart growth on the large toe, preceding the growth on the thigh. The other case, a girl nine years old, had a moist infection of her toes preceding the growth. The growth was removed, and the gross pathological diagnosis was cancer. This occurred about fifteen years ago, and she is still living, but has some swelling of the leg.

Dr. Kirby (closing).—Cases of acute inflammatory cancer, the leathery breast, as Dr. Boland stated, should be left alone.

For advanced inoperable cancer, anything that will offer prolongation of life and not destroy hope in these patients seems to be in the line of justifiable treatment.

I am not advocating propaganda, through daily newspapers and weekly journals, upon the cause of cancer.

CESAREAN SECTION: A STUDY OF TWENTY YEARS' EXPERIENCE*

By Percy W. Toombs, M.D.,
Memphis, Tenn.

So much has been said and written concerning cesarean section that one presents himself before an audience such as this with some trepidation in announcing his subject. In the years of my professional life which are now behind me, I have seen a great change in the attitude of obstetricians toward this particular surgical procedure, one of the most hazardous of all interventions upon the human body from the days of Julius Caesar to those of Louis Pasteur. When Lister put into practice the deductions of the great French chemist it became possible to open the uterus by laparotomy with relative impunity. From that day forward abdominal section as a means of solving the sorely vexing problems presented by "difficult labor" enjoyed a steadily increasing popularity.

When I first began the practice of obstetrics, surgeons, not necessarily obstetric ones, either, were wont to mention the number of cesareans they had done with something of the pride and satisfaction an Indian feels in the scalps which adorn his belt. This complacent attitude continued to prevail up to the time of our taking part in the World War. Only here and there a voice, like that of Holmes of Chicago, was heard crying in the wilderness that the indications for section are actually very few indeed, and that its promiscuous employment was contrary to good obstetrics and plain common sense. Since the War these isolated complaints have swelled into a distinctly audible chorus, and I am proud to say that I have not kept silent when choristers were so greatly needed.

At present the medical profession is awake to the dangers attending the introduction of surgical procedure into labor except under the most extraordinary circumstances. The pendulum is swinging the other way. It is rapidly becoming something requiring courage even to speak favorably of it in the presence of other practitioners. Nevertheless, I have summoned this courage, and in place of dilating on the abuse of cesarean section as I am oftentimes tempted to do, I hope to set forth clearly just what indications justify us in doing this operation, and to show how, given the indications, the procedure can be divested of many of its drawbacks and hazards by careful selection of the type of intervention to be used, and by the most rigid precautions both before and after the section is done. My observations are based upon a careful study and review of 185 of my own cases, as well as a thorough investigation of the work of other obstetricians during the time period covered by my own experience.

*Read in Section on Obstetrics, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

INDICATIONS

Before the era of aseptic surgery the indication for cesarean section was contracted pelvis only. If the child could not be maneuvered or dragged into the world by the exercise of all the accoucheur's skill and strength, as a last resort it was cut down upon from the outside. Under the ancient Roman law no woman who died in labor could be buried undelivered. To section the abdomen of the dying mother gave the child *in utero* a slender chance of life, and was no more difficult nor distasteful than the postmortem procedure. The 100 per cent mortality could not well be increased.

Now and then an unusually vigorous, or fortunate, woman surprised her obstetric attendants by surviving. This led a few optimists to hope that the day might come when abdominal delivery could be accomplished with no greater hazard than accompanied the other means of coping with difficult labor. This hope was partially realized in 1876, when Porro came forward with his technic of abdominal section followed by hysterectomy with fixation of the stump of the amputated uterus in the abdominal wound. Twelve years later it was possible to tabulate 264 operations of this character which had been performed with a fair average of success. The indications, however, were not appreciably widened. Section was done only in the more difficult cases and contracted pelvis remained practically the only indication. As modified by Sanger, the procedure permitted the suturing and preservation of the uterus in cases known or thought to be non-infected, and this offered to women anxious to become mothers of families a means whereby their desire might be gratified, even when their skeletal structure absolutely forbade delivery by the natural passages.

Not until the present century had advanced a number of years did we see any noticeable departure from this age-long mental attitude of regarding cesarean section only as a means of last resort. It is the custom of writers at present to refer to the year 1907, when the Cologne

surgeon (Frank) devised a new procedure which obviated the necessity of lifting the gravid uterus out of the abdominal wound, and greatly increased the woman's chances of future childbearing, as the date when the indications for surgical intervention in labor began to be widened. Even before this time immense strides had been made in aseptic surgery of every kind, particularly in abdominal surgery, and the increased employment of cesarean section and its use under circumstances where it would not even have been thought of a few years before was inevitable. The indications increased so rapidly that by 1922 we find B. C. Hirst listing them as follows:

(1) A moderately contracted pelvis, in which one or more previous labors have ended disastrously for the child;

(2) Arrest of the head in the upper third of the birth canal, after a satisfactory test of labor;

(3) Breech presentation in an elderly primipara;

(4) Placenta previa in a primipara, whether central or partial;

(5) Moderate hydrocephalus;

(6) Impacted shoulder presentation, with or without prolapse of the arm, when the child is alive and in good or fair condition; and

(7) Face or brow presentation, with the chin posterior, and the baby living. The operation is always indicated as an alternative to the employment of axis-traction forceps; and he adds, rather naively, that "This is, by no means, a complete list."

Even earlier Asa B. Davis told the obstetricians assembled at the Twenty-Fifth Annual Meeting of their American Association that his indications for performing cesarean section were "in the main, in well-considered cases:"

Contracted or otherwise deformed pelvis; eclampsia; placenta previa; accidental hemorrhage; prolapse of the umbilical cord with live child and rigid undilated cervix; tonic uterine contractions; after ventral suspension or fixation of the uterus; new growth, tumors, obstructing or preventing dilatation of the birth canal; face impacted with chin posterior; rupture of the uterus with living child; large child with marked disproportion between it and the capacity of the mother's pelvis, regardless of the measurements; mothers about to die from any cause, fetus alive; performing an antemortem rather than a postmortem operation wholly in the interest of the child; in the case of women who give histories of repeated vaginal deliveries, craniotomies, high forceps, induction of premature labor, and yet have no child.

For comparison of the point of view prevailing at present, I will cite some of the conclusions made from the survey of cesarean section as performed in the hospitals of the City of New Orleans over a recent six-year period:

"In view of the fact that given a fairly normal pelvis, the average case of malposition (breech, transverse, occipito-posterior, etc.) can be delivered satisfactorily by the vaginal route, it is not apparent that malposition *per se* furnishes an adequate indication for cesarean section. . . .

"In view of the fact that the death rate among premature infants in this series is over 36 per cent, it would seem that the mother's safety should be the paramount consideration . . . while the comparatively low maternal death rate in placenta previa . . . suggests the wisdom of its use occasionally . . . the high death rate among infants thus delivered suggests that cesarean section should seldom be performed in the interest of the child . . . unless near term . . . the mother's safety should be the paramount consideration. . . ."

And finally

"A maternal death rate of even 10 per cent is too great a risk to which to expose parturient women, and we should suggest careful consideration of the following points . . . (a) operation only on strict and established indications; (b) consideration of the possibilities of vaginal delivery before abdominal delivery is decided upon; (c) strict differentiation of cases into infected and non-infected; and (d) delivery by the vaginal route in those cases where the complications of pregnancy which demand prompt evacuation of the uterus may be handled with equal safety to the mother by this method, particularly when the child is premature and its viability doubtful."

This contrasting quotation shows how our pendulum has been swinging, now forward, now back. I would not presume to say that it has as yet reached its center of gravity, but I can not help but feel it is nearer that position today than it has been for some time. I find myself in complete agreement with the late Mosher, who said that the whole question is really one of education.

"If we can convince ourselves of the proper indications for cesarean section, that they are definite and that the violation of the recognized limitation will surely be punished, we shall become better obstetricians and the patients will be saved the risk which it is needless to attempt to emphasize, and which they are forced to take with results that outrage the obstetrical conscience as well as the principles of good surgery."

Newell, in the new edition of his text-book, recently off the press, sums up the matter in this wise:

"These three indications, the preservation of maternal life and health and of fetal life, constitute the only justifiable indications for the operation. The 'absolute indication' is confined to the situation where the true conjugate diameter measures 5 centimeters (2 inches) or less. . . . This is practically the same indication that obtained in the early days of the operation, when the maternal mortality resulting from cesarean section was so high that the prognosis of the operation was nearly hopeless."

Apparently we are no more approaching a general agreement as to the "relative" indica-

tions than we were before the operation became popular. Failing this, each operator must rely upon his own skill, judgment and experience, all guided by that intangible something which, for want of a better title, we call the "obstetric conscience." Just the same lack of unanimity prevails in respect to what constitutes a reasonable "test of labor." Personally, I believe that many conscientious accoucheurs make this test too severe. The woman should not be allowed to become greatly exhausted before operative relief is offered her. Many of these women are allowed to descend to the very gates of death, yes, and to pass beyond them also, because we delay to resort to the inevitable. No patient should be allowed to suffer indefinitely; there should be an accepted standard of what constitutes a "test of labor." While some maintain that it implies complete dilatation, ruptured membranes, and pains of good force, at intervals of not more than five minutes, continuing for at least an hour, I am of the opinion that a woman who has forceful contractions for several hours with no appreciable progress toward complete dilatation, and little or no engagement of the fetal head, presents a sufficient indication for operative interference. Certainly we should not be guided by any time limit; we should watch the birth canal, not the clock. We should note the ebbing of the woman's strength and resisting powers, not the passage of minutes and seconds.

Table 1

INDICATIONS FOR CESAREAN SECTION

(1) Contracted pelvis		48
(a) Elective sections		
(1) Deformed pelvis	19	
(2) Deformed pelvis with previous section	21	
(b) Emergency sections		
(1) Dystocia in deformed pelvis	8	
(2) Indications other than contracted pelvis		137
(a) Elective sections		
(1) Previous section with disproportion	5	
(2) Previous dystocia with fetal mortality	20	
(3) Obstructing pelvic tumor, myoma uteri	2	
(4) Habitual death of fetus	2	
(5) Sacculation of uterus from fixation by previous operation	3	
(6) Cardiac disease	3	
(7) Pulmonary tuberculosis	2	
(b) Emergency sections		52
(1) Dystocia		
Disproportion	29	
Disproportion and previous section	1	
Cervical dystocia in elderly primiparae	22	
(2) Placenta previa	11	
(3) Abruptio placentae	2	
(4) Eclampsia	16	
(5) Pre-eclampsia	19	

Just how I have been accustomed to judge in such cases will be apparent from a perusal of *Table 1*, which gives the indications I found sufficient in the cases represented in the series under consideration. Before going on to discuss these in detail, I should make some statement in regard to my preference for the high classical operation over the low cervical procedure which is now receiving, and for the past six or eight years has enjoyed, a continually increasing popularity. In my hands the high classical operation has proven that of choice in all elective cases, and in all emergencies wherein potential infection was not a factor of paramount importance. At the risk of being ranked with the old fogies I shall continue to employ and recommend this procedure in preference to that popularized by DeLee, Beck, Hirst and others, largely because my results have been so uniformly good that I can see no reason for adopting any other technic. Some of the operations included in this analysis were done before the low cervical procedure became popular, and it may very well be that cases where infection is undoubtedly present may be handled to greater advantage by this intervention than by that which I am accustomed to use. Nevertheless, I continue to feel that exceptionally only will the low cervical operation give me the uniformly satisfactory results I have been obtaining from the high classical procedure.

Especially in the matter of repeated section is the high classical operation to be preferred. In those cases where I have been called upon to do a second or even a third section upon the same patient, I have found adhesions in but two instances, and these were neither dense nor widespread. When a high incision is made above the umbilicus, not more than two or three inches in length, and thence carried down through the abdominal wall and uterine fundus; when proper precautions are taken to prevent escape and soiling by amniotic fluid; when the uterus is carefully closed, with the serous coat inverted and abdominal peritoneum everted, there is little chance for the formation of adhesions.

It has been my personal observation that the low cervical and the extra-peritoneal route seem to involve greater mortality than does the classical method. This I account for by the fact that the cases selected for the low procedure are the less favorable. They have been potentially infected or badly managed before the section was undertaken. In my opinion, however, I am not borne out by some very competent observers.

Thus Couvelaire and Portes, of Paris, hold that suture made upon the portion of the uterus undergoing only slight contraction will be more perfect and not

so likely to form extensive scar tissue as where the entire muscular wall of the uterus must be sutured; that from the point of view of peritoneal reaction the low operation gives greater guarantee against ureteroparietal fistula, or postoperative ileus from adhesions; that it is potentially less dangerous than the high section in cases known or thought to be infected, although in these circumstances the final outcome of surgery will depend not so much upon the place where the incision was made as upon the variety and virulence of the infecting organisms. The British obstetrician, Cameron, while emphasizing that the classical procedure offers the advantages of shorter duration, ease of exposure, fewer technical difficulties and less troublesome delivery of the child, declares all these points in its favor are more than offset by what his experience has shown to be advantages of the low cervical method, namely: better protection against hemorrhage, peritonitis and adhesions, together with shorter and smoother convalescence and less risk of rupture in subsequent pregnancies.

On the other hand, Hirst agrees with my viewpoint in saying that "there are no disadvantages unless there is contamination" (in the short high classical incision, especially if elective). When contamination exists there is the disadvantage of "the slight unavoidable spill into the abdominal cavity; there will be some risk of peritonitis." How great I have found this risk to be can be learned from examination of the accompanying tables. By comparison of my figures with those of others recently published, the truest estimate of the soundness of my conclusions can be reached.

POSTOPERATIVE TREATMENT

There is no doubt that whatever the method used of opening the uterus and extracting the child, the ultimate success of the entire procedure depends in large measure upon the conditions obtaining before operation and the care which the mother receives following surgical interference with the natural process of parturition. Of course, in emergency cases there is seldom opportunity for the amount of preoperative preparation everyone knows to be desirable. Where the section is elective my patients are admitted to the hospital the previous evening, receiving sodium amytal (gr. vi) upon retiring. Two hours before operation there is a further administration of morphine, gr. 1/6, and scopolamine, gr. 1/130. After the lapse of 45 minutes scopolamine gr. 1/260 is given; and the same dosage is repeated after another 45 minutes. Thus by the time the patient reaches the operating room she is so well narcotized that she is relieved of the nervous shock which she might otherwise sustain on seeing the array of white-clad operating attendants and surgical paraphernalia awaiting her. I consider the elimination of this psychic factor of very great importance. In the instances where we have been aware for some time that section would be necessary, pains are uniformly taken to keep up the patient's fluid to a high level and to see that she is well nourished when she comes to operation. The avoidance of dehydration lessens the operative risk and adds greatly to comfort and well-being throughout.

In emergency section, where there has been frequent vaginal examination, with most probably instrumental attempts at delivery as well, it is my routine to have the vagina swabbed out with dilute iodine, after which the low cervical procedure is carried out, the regular classical intervention being reserved for patients in a better state of preparation.

In either method of approach I have adopted for postoperative care the regimen which I long ago outlined for a third-repeated operation for hernia:

Immediately upon the return from the operating room a tap-water rectal drip is started. This is continued intermittently until gas is expelled from the rectum, usually about 48 hours. During this time absolutely nothing is given by mouth, but following the passage of gas sips of hot water are administered hourly, and on the afternoon of the third day this is changed to hot tea, which is regularly received with relish. Tap water may be substituted for the hot water if this is well tolerated from the first. The third evening the patient receives a soap suds enema. The fourth day witnesses the beginning of liquid nourishment, gradually increased to soft diet and then to regular light hospital diet. No solid food nor cool drinks are given at any time during the hospital stay. This relieves the intense nausea, vomiting and gas formation which used to complicate convalescence in the earlier sections.

The head of the bed is elevated eight inches as soon as the immediate postoperative reaction has taken place, and an ice bag is kept over the dressing upon the abdominal incision. Morphine in 1/6 gr. doses is given as necessary to insure comfort and rest during the first 48 hours. If any sedative is needed after this amytal (gr. 1½) is administered as required.

Since making this regimen routine for all my gynecological cases involving laparotomy I have not had a single case of postoperative nausea nor distress, although there may be a few complaints during the first 48 hours.

DISCUSSION OF CASES

Coming now to an examination of my tables: of the first, indications for cesarean section, there is little to be added to what has already been said. It will be noted that though a considerable number of indications is listed, actually very few procedures were carried out for any indications other than the most widely and conservatively accepted. The possible exception might be elderly primiparae with cervical dystocia. The use of section in cases of this character is the logical outcome of my belief in limiting the time spent for test of labor. The ultra-conservative might also question my use of the operation in eclamptic and pre-eclamptic conditions. In recent years I have done fewer and fewer operations for this indication. Six deaths from this complication of pregnancy are recorded in this series. At the time these occurred the best obstetric practice concurred that a cesarean was the logical way of eliminating the toxic conditions upon which eclampsia was then supposed to be wholly dependent. More study of this much dreaded disease, if it can be so called, has led to a reversal of opinion in this regard, and I have now come to believe that resort should be had to abdominal section in eclampsia only when active elimination treatment has entirely failed, and the operation can be done soon after the first convulsive seizure.

Table 2 illustrates in graphic form my preference for the high classical route over all others. It also shows how often the specializing obstetrician is called upon to do emergency sections when all other methods have failed to accomplish delivery.

Table 2

TYPES OF CESAREAN OPERATION PERFORMED

	Elective	Emergency	Total
High classical	77	103	180
Low cervical	0	3	3
Porro	0	1	1
Vaginal	0	1	1
Totals	77	108	185

Table 3 is of interest as giving data on the much vexed question of the obstetrical future of her upon whom cesarean section has once been performed. The most important observation here was the relative freedom from troublesome adhesions seen in those women whose previous sections had been done by the classical method.

Table 4, maternal and fetal mortality, is undoubtedly the most interesting and important of all. In these figures we have the inescapable answer to all the questioning as to the wisdom of this or that procedure, or the desirability of doing abdominal delivery under any circumstances. My mortality will be seen to be 5.94 per cent, which represents eleven cases terminating fatally for the mother. Eight of these women were referred cases, brought in from outside towns, often having traveled a considerable distance after being in labor for a long time, and undergoing repeated examination and attempts at delivery. Three women whom I had had opportunity to observe during the gestation period also died, making the mortality of my personal cases 1.6 per cent.

The rate for puerperal fever, 6.6 per cent, cannot but be regarded as excellent in view of the high potentialities of infection always present with this type of surgery. I account for it by the small number of vaginal examinations (0.2 per cent), the low average of time between the onset of labor and the operation (18.5 hours), and further, to my principle of not permitting the patient to become wholly exhausted before coming to her relief.

Comparing my total mortality with that of some other recently reported series: in E. von Ammon's review of 17,071 German and American cases, there was a mortality rate of 5.76. In a series reported from Moscow for the years 1921-1927 the total maternal mortality was 7.8 per cent, practically all the operations being of the classic type. From the Chicago Lying-in Hospital, Greenhill reported on 874 cervical sec-

Table 3

NUMBER OF PRIOR CESAREAN SECTIONS

(1) Total number of sections		185
(2) Total in which previous sections were performed		22
One previous section	19	
Two previous sections	3	

Table 4

MATERNAL AND FETAL MORTALITY

(1) Total number			185
(2) Maternal mortality (all cases)		11	5.94%
Pneumonia	2		
Paralytic ileus	1		
Eclampsia	6		
Chronic heart disease	1		
Cardiac embolus	1		
(3) Mortality in elective group			
Total elective operations	77		
Total mortality		1	1.29%
(4) Mortality in emergency group			
Total emergency operations	108		
Total mortality		10	9.2 %
(5) Fetal mortality (total)		10	5.4 %
Intracranial hemorrhage	2		
Placenta previa	2		
Eclampsia	4		
Prematurity	2		

tions, with a mortality rate of 1.26. For 147 classic sections in the same institution the mortality was 4.76. In the survey of the City of Los Angeles as to cesarean operations performed in the preceding six years, the average for twelve hospitals was found to be 4.2 per cent. Hirst, in December 1929, reported a total maternal mortality of 8.33, with as high as 11.9 per cent among the emergency, that is, infected cases.

Comparing my fetal mortality of 5.4 per cent: with J. C. Hirst's at the University of Pennsylvania Hospital, 20 per cent; with the combined German-American figures, 8.8 per cent; with the Moscow series, 10.4 per cent; with the Los Angeles survey, 7.9 per cent, it would appear that as many as my mothers were justified in undergoing the risk and anguish of this major procedure for the sake of bringing living children into the world as were any of the women represented in these different tabulations.

With *Table 5* we enter into a field often highly controverted. There is still much difference of opinion as to the proper application of cesarean section in dystocia cases. Mosher asserted that inasmuch as

"maternal mortality is increased by leaps and bounds through rupture of the membranes, attempts at forceps, induction, version, craniotomy or even frequent examinations *per vaginam*, previous to the section" dystocia cases so handled should be treated by craniotomy rather than section, no matter how reluctant the accoucheur may be to perform this operation on a living child.

Table 5

CESAREAN SECTION IN DYSTOCIA GROUP

(1) Total number			60
Contracted pelvis	24		
Disproportion	18		
Cervical dystocia	18		
(2) Average number of hours of labor before section		18.5	
(3) Average number of hours membranes ruptured		9.9	
(4) Average number of vaginal examinations		.2	
(5) Number of patients febrile preoperative		10	
Classical	9		
Cervical	1		
(6) Types of cesarean section employed			
High classical	55		
Low cervical	3		
Porro	1		
Vaginal	1		60
(7) Maternal mortality		10	
Eclampsia	6		
Paralytic ileus	1		
Pneumonia	1		
Chronic heart disease	1		
Cardial embolus	1		
(8) Febrile morbidity (eliminating 3-day postoperative fever and causes other than puerperal fever, as pyelitis, pneumonia, ileus, intestinal obstruction, incision infection)		4	6.6%

Davis, on the other hand, says: "This operation has earned something better than to be a last resort in difficult or impossible deliveries through the pelvis. For both mother and child, the immediate and ultimate results are better and the dangers not so great as in many of the forceps, versions and *accouchement force* deliveries; it is a much more surgical procedure than any of these operations."

There was not one of my dystocia cases entered upon without careful consideration of all the factors involved, even though in some desperate ones the decision had to be made with the utmost celerity.

Table 6

TOTAL FEBRILE POSTOPERATIVE MORBIDITY

(1) Total number of cases analyzed		185	
(2) Total febrile postoperative morbidity, excluding postoperative reaction		35	18.91%
(a) Morbidity from causes other than puerperal fever			
(1) Pyelitis	21		
(2) Paralytic ileus	1		
(3) Eclampsia	3		
(4) Intestinal infection	1		
(5) Incision infection	5		
(b) Morbidity due to puerperal fever			
(1) Endometritis	2		
(2) Lochial block	1		
(3) Abscess uterine wall	1		
(3) Puerperal fever analysis			
(a) Elective group of 77 cases there were febrile none			
High classical	0		
Low cervical	0		
(b) Emergency group: of 108 cases there were febrile 4			3.7%
High classical	3		
Low cervical	1		

Arrived at the consideration of maternal and fetal mortality as shown by *Table 6*, it will be seen that more than four-fifths of my patients had an afebrile convalescence, which compares favorably with any post partum records in general hospital and private practice, with all types of delivery, spontaneous or assisted. Of the morbidity due to puerperal fever, I have already spoken. It will be noted that in the elective group, done by high classical method, there was no incidence of this grave complication. This merely indicates the great advantage of doing cesarean section under elective conditions, with the surroundings and apparatus required for its performance, as ideal as possible. It goes without saying that physician and patient would always prefer to have the procedure done under such conditions. That the percentage of puerperal infection in the 108 emergency cases, in many of which the conditions were very far from ideal, was held down to no more than 3.7, permits one to cherish the hope that in the future, even under emergencies, we may be able to

rule out this greatest of enemies of the parturient woman.

Table 7

WOUND COMPLICATIONS

(1) Total number of sections			185
Elective	77		
Emergency	108		
(2) Total wound complications		10	5.4%
Elective group	3		
Emergency group	7		

Our last table, *No. 7*, hardly demands comment. Possibly the fact that any wound infection took place in the elective cases may lay our technic open to criticism. So few of the published series make any mention of wound infection that I am unable to draw comparisons in regard to my private figures.

CONCLUSIONS

Although the indications for cesarean section have, during the past two decades, been extended far beyond the limits set by conservative surgery and good obstetrical common sense, there yet remains a considerable field where this procedure should be practised. Its legitimate use should be encouraged, not condemned: but all who do maternity work, whether or not they be specialists, should be alive to the danger of permitting surgery to invade the domain of obstetrics unless such invasion be absolutely necessary for the preservation of life and health in both mother and child.

The low cervical procedure has attained great popularity during the past decade. For certain special indications, notably cases infected or thought to be infected by much previous handling and instrumentation, this procedure should be given the preference over the older approaches to the uterus. I am still of the opinion, however, that the high classical section should be the route regularly chosen, and the only one adopted where the section is by election.

The author's results in a series of 185 cases compare favorably with those reported by other cities and operators, but after looking them all over, one is left with the melancholy impression that the mortality and morbidity which attend cesarean section even under the very best conditions are higher than for any other major operation of similar character. Therefore, we must continue to look upon it as hazardous in the extreme, and only to be undertaken after the most minute consideration of every factor involved. The operation is a life-saving one, unique in that it saves two lives instead of one when successfully carried out. It should always be regarded with the utmost respect, and never subjected to the danger of incurring that familiarity which breeds contempt.

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DISCUSSION (*Abstract*)

Dr. W. R. Cooke, Galveston, Tex.—The point in Dr. Toombs' paper which I think should, more than any other, be driven home to our consciousness is the real danger of the operation. If an obstetrician of Dr. Toombs' training and great experience must report a mortality of 5.94 per cent, it is easy to see that we are dealing with an operation which entails a risk equal to that of the most formidable intra-abdominal operation. Yet this operation is constantly undertaken by men who would not dare to attempt, for instance, a radical hysterectomy of the Wertheim type. The result of this temerity has been shown in numerous studies of the cesarean sections performed in different communities, New Orleans, Houston, Galveston, New York, and others. In 1927 I reviewed the sections performed in the John Sealy Hospital over a certain period. The four members of the obstetric teaching staff of the University of Texas, in 2,049 deliveries, had an incidence of 1.6 per cent, one section in each 62.5 deliveries. During the same period the non-teaching group had an incidence of about one section in ten deliveries and a mortality of 18.7 per cent. Another review just completed shows, in 3,503 deliveries by the obstetric staff, an incidence of 2.1 per cent (due to an unusually large number of referred cases in 1930; for 1931 the incidence has been less than 1 per cent); the non-staff group had an incidence of 9.8 per cent, with a mortality of 11.1 per cent.

In considering the appalling status of cesarean section in the United States today, one comes to certain conclusions:

(1) That our medical schools give better training in surgery than in obstetrics, and that the graduate carries

away very little in the way of a permanent obstetric conscience.

(2) That because of the constant effort involved in maintaining skill in the major maneuvers of obstetrics, because of the tediousness of the proper conduct of labor, because of atrophy of the obstetric conscience, because of easy access to operating rooms, because of the ready availability of fairly competent surgical consultants and the great scarcity of competent obstetric consultants, and for other less creditable reasons, the average doctor rushes to section whenever labor becomes inconveniently prolonged.

(3) That there is a vast carelessness in regard to asepsis in the conduct of labor, and a vast ignorance of the elements in the conduct of labor which convert the clean into the infected case. Hence the fact that sepsis and peritonitis are the prevalent causes of death in unskilled hands, the rarest in skilled hands.

(4) That pelvimetry is an unknown art. The writer has seen spontaneous and easy deliveries in eighteen cases previously sectioned on the basis of contracted pelvis.

(5) That under existing conditions attempts at the major maneuvers by the unskilled would probably result in a greater maternal mortality, and certainly in a greater maternal morbidity and fetal mortality, than cesarean section performed by competent surgeons in properly conducted cases.

How is the situation to be ameliorated, as it must be if our profession is not to remain responsible for annual thousands of unnecessary deaths?

As regards the future, our greatest hope lies in the more adequate training of our students in obstetrics and in the obstetric conscience. Since the great majority of deliveries are conducted by general practitioners, and since the majority of our students will become general practitioners who will do relatively little major surgery, it follows that far more time should be given to the teaching of obstetrics than to the teaching of surgery in our medical schools.

As regards the present, the application of three very simple principles would lessen the number of sections performed and almost eliminate the two great causes of death after cesarean section. These three principles are:

(1) Every case should be conducted as if cesarean section were contemplated: which means absolute non-invasion of the vagina after the thirty-second week and neither vaginal nor rectal examination during labor. (Such examinations are nearly always made for the convenience of the physician and not for the welfare of the patient.)

(2) Every case should receive a real test of labor, except in cases of obviously absolutely contracted outlet; but this test should not be excessively prolonged, as adjudged by the condition of the patient, especially after rupture of the membranes.

(3) Cesarean section should not be done in eclamptics except for an imperative indication.

Dr. W. E. Levy, New Orleans, La.—Some of us in this region, particularly in the Tulane group, rather take exception to the high section even in a clean case. We routinely, at least at Touro, do the low cesarean section. Some of you may say that it consumes more time and is technically more difficult. As to the time, possibly because you have more dissection to do and more hand work, it amounts to more, but I think we should take Polak's advice, that is, in doing a cesarean section do not operate against the clock; use such speed as is consistent with the safety of the patient. Sacrifice of speed adds to the safety of the patient. We all know the pelvic perineum will stand infection infinitely better than the higher abdomen. No matter how clean the case, we may get infection.

The low section is not difficult if we are careful and know our anatomy. It is surprisingly simple. As to the danger of a second section, I am inclined to believe the low section will not rupture as readily in the second section as in the first. The recovery following the low section is smoother. We very seldom see postoperative vomiting; we do not see the dilated stomach where the patient has a Jette tube with lavage. As a matter of fact, it is our routine that for 24 hours after section the patient is kept on a soft diet. Very seldom in low section do we see infection. Therefore we do not traumatize. With the low cesarean we can attempt more in cases that we were afraid to attempt before; there is not the danger from peritonitis and a much smoother recovery is the result.

We never do a cesarean in the presence of the toxemias of pregnancy if we can use any other means of delivery. It adds to the mortality and is not in the interest of the baby.

When we attempt cesarean section and hemorrhage occurs, it is necessary to have blood donors ready.

Dr. Joseph E. Green, Laurel, Miss.—I, too, have had about twenty-two years' obstetrical experience, not much in hospitals until last year. Personally, I do not believe that eclampsia is ever an indication for cesarean section unless there is a contracted pelvis. In the Charity Hospital at Laurel, 300 cases passed through our hands, 22 per cent with eclampsia. We did no cesarean section and had no deaths. With the modern means of controlling eclampsia it is not necessary. You have to have a heart and a conscience, and let your conscience be your guide.

I am a country doctor, and I carry a pair of forceps in my bag. Cesarean section is a'l right in the city, where you have men like Dr. Levy and Dr. Toombs, but do not go back home and think you will get the results they indicate.

Dr. James R. McCord, Atlanta, Ga.—In the ten-year period, 1921-1931, in our clinic at Colored Grady Hospital, there were 10,708 deliveries. I think we are running as conservative a clinic as possible. We have had 25 cesareans in 10,208 deliveries, 1 cesarean to 428 deliveries. There were four deaths, a mortality of 16 per cent. One of these was a spinal anesthesia death, bad technic; so our real cesarean mortality was 12 per cent. The types of operation done were as fol'ows:

Classical, 24 per cent; mortality 16.7.
Low cervical, 44 per cent; mortality 18.1.
Porro, 8 per cent; no mortality.

In 56 per cent, it was the first baby; in 32 per cent, the second, and in 12 per cent the third. Eight of these multiparae had had a previous cesarean operation. Five of these eight had the previous section because of a contracted pelvis. The other three had the cesarean for uterine inertia. In two of the inertia cases the pelvis was borderline, and in all three of them the women were in labor 60 hours or more before operation.

Twenty-four per cent were not in labor at the time of operation. Seventy-six per cent were in labor at the

time of operation. Eleven cases had been in labor from one to twenty-five hours; five from 25 to 60 hours; three from 72 to 140 hours. Forty-two per cent had been in labor more than 25 hours. The membranes were intact in 80 per cent of cases, and ruptured in 20 per cent. At the time of operation the spill was recorded as foul in three cases.

Two of these had low cervicals and died of septicemia and peritonitis, so the low cervical is not a panacea for all women. The other had a Porro operation and lived. Sixty per cent had contracted pelvis; 12 per cent had had a previous cesarean; 4 per cent had preeclamptic toxemia, and 8 per cent had eclampsia. There was one case of brown presentation, one of inertia, and one of abruptio placentae, and one with large intraligamentous cyst. Forty per cent of all the women operated upon had a strongly positive blood Wassermann reaction.

Twenty-four of the babies were alive at the time of operation, and twenty-four women left the hospital with living babies. One baby was dead before operation, and we knew it at the time.

These cases were done by six or eight men, all of whom were good obstetricians. The cases were carefully selected, the operations were done conservatively, and yet we have a total mortality of 12 per cent. I am getting more conservative every day I live, the more I see of obstetrics and cesarean section.

Dr. S. B. Hinkle, Little Rock, Ark.—As far as cesarean section is concerned, I am a conservative. I do not do a cesarean in eclampsia with the patient in labor and having convulsions. If we have a patient who has had convulsions before labor sets in, we try to establish renal function and as nearly as possible approach the normal state. Then when the toxemia is at the lowest ebb, with the patient in better condition than she will be a few days later we terminate pregnancy by the least dangerous means.

Dr. C. W. Karraker, Louisville, Ky.—It is of great interest to me to hear that someone still holds to the classical operation. I have been using the classical high operation for about twenty years and feel that I get good enough results to say it is all right.

I was glad the doctor brought out the fact that two cases of failure to get a living baby by the vaginal route is sufficient cause for a cesarean.

We all agree that it is almost obsolete to do a cesarean for eclampsia.

After a cesarean has once been done, we have to be very careful, especially after a long convalescence in the first operation; but I know of a number of women who have had four or five operations without any trouble.

One of the discussants spoke of examination before the operation as being dangerous, but when this is done in a hospital under aseptic conditions I do not hesitate to do a cesarean unless forceps have been applied, in which case the condition is much more serious.

I believe a cesarean is far better than a high forceps delivery, for instance, when you have a Bandl's ring that fails to dilate.

If we know the fetus is dead, it is better to do a section than to take it through the vaginal canal unless the cervix dilates easily.

Dr. Toombs reports two cases of intracranial hemorrhage in the baby after cesarean section. I judge these were cases that have been in long labor, twenty to thirty hours.

Dr. Toombs (closing).—Cesarean section for eclampsia was done in the series some twelve or fifteen years ago when the best minds in America were in agreement that this was the best course of procedure in so formidable a complication of pregnancy.

It was not my purpose to present this analysis to create a discussion of the relative merits of the low cervical and high classical operations. I have given you a resume of my own experience with the high classical operation, which has been satisfactory.

THE TREATMENT OF EMPYEMA IN SMALL CHILDREN*

By W. Roger Moore, M.D.,
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An extended review of the literature on empyema will not be attempted in this paper. A splendid review with an exhaustive bibliography was published in one of our recent Southern Medical Journals. A short statement of the present status of treatment of empyema alone will suffice.

There are two conflicting methods of treatment prevalent in surgical practice at the present date. One of these methods consists in a temporary use of aspiration of the chest content during the period of the pneumonia followed by late surgical drainage. This treatment is based on the physiological facts that during the stage of pneumonia the patient's vital capacity is greatly reduced, his mediastinum is not fixed, and the pleural exudate can be withdrawn through a needle. Any opening in the chest at this time may push the mediastinum over and interfere with the normal lung respiration. Such an interference with pressure may cause further reduction in the patient's vital capacity and produce alarming symptoms. After some time has elapsed the pneumonia resolves, the vital capacity is increased, and the patient is then operated upon either by open or closed drainage. During this stage of waiting repeated aspirations are used as a temporary measure with ultimate surgery in view.

The second plan of treatment consists in aspiration only for diagnostic purposes and an immediate operation of the closed type is done. This closed drainage may be carried out through a simple incision with tube insertion or by a

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trocar thoracotomy. A continuous negative pressure results and drainage is accomplished with no air entering the chest.

In the past few years many papers have been published on the treatment of empyema. Practically all of these papers have been concerned with the technic of the surgical procedure or drainage. Each surgeon has his own individual pet scheme of drainage to carry out one or the other of the principles outlined above. All of these authors have discussed and practised aspiration only as a temporary means of relief and have not considered it to be a method of cure in itself.

Paracentesis of the chest as a mode of treatment in chest exudates is not new. In 1844, Hamilton Roe, of London, advocated aspiration as a method of treatment. Henry I. Bowditch popularized this treatment in America in 1852 by a paper on "Pleuritic Effusions and the Necessity of Paracentesis for Their Removal." Of the acute cases studied by the Empyema Commission in the World War, 13 per cent recovered after aspiration alone. In 1929, McEnery and Brennemann published an article advocating the treatment of empyema in very young children by repeated aspiration. They conclude that it is the method of choice in infancy, that it will often cure children between 3 and 6 years of age, but that in older children it will seldom result in a cure. They point out a lower mortality than in surgical treatment and a reduction in the hospitalization time. They present 32 cases with a 9 per cent mortality to justify their conclusions.

Danna, of New Orleans, in 1931 published a report on a series of cases treated by repeated aspirations with a replacement of the aspirated fluid by an equivalent amount of air. He reports 35 cases in all age groups treated by this method with no failures and no chronic chest cavities. The advantages of this method are said to be that there is very little trauma to the pleura or lung, adequate removal of pus, and no irritation and resultant scar tissue by a drainage tube. This work has been very recent, and at the present time certainly has not been extensively adopted.

Several attempts to irrigate or inject bacteriocidal substances into the chest cavities have been made. Gentian violet and optochin have been used with some success. In 1925, Major reported 57 cases of empyema treated by gentian violet, with recovery in 45. He practised repeated aspiration followed by injection of a gentian violet solution. In 1929, Lowenburg used optochin by aspirating pleuritic contents and injecting this drug in a watery solution. He reports 9 cases of pneumococcus empyema with a recovery in 55.5 per cent and later operation in 44.5 per cent. None of these drug injections has been extensively adopted. How much of the success of the treatments depends on removal of chest fluid and how much is due to the drug is problematical.

The mortality statistics for empyema are very confusing. There is a great variation in the mortality reported by different authors. This variation in statistics is probably due to a variation in the virulence of the infecting organism in different epidemics. The virulence of any individual organism varies from time to time. One can not compare the mortality for one series of cases with another series occurring in another locality in a different year.

The general mortality for empyema of all ages is variously quoted to range from 10 to 20 per cent. The younger the child the higher the mortality. Since empyema is most frequent in infancy, and decreases proportionately with age, further reduction in mortality depends upon more effectual treatment of the very young child. The mortality under two years of age has always been very high, ranging between 16 and 70 per cent. From 3 to 6 years the mortality decreases to the neighborhood of 25 per cent, and above this age statistics vary between 3 and 11 per cent.

McEnery and Brennemann report an operative mortality in their hospital on the surgical service as 25 per cent in comparison with an aspiration mortality of 9 per cent. Deryl Hart reports a 10 per cent mortality in 50 cases by his tidal irrigation method. He compares a 7 per cent mortality in 15 cases under 2 years treated by tidal irrigation to a 29 per cent mortality for patients of the same age treated by rib resection and open drainage. The 1928 mortality of the St. Louis Children's Hospital was 2.7 per cent in 36 cases treated by aspiration and rib resection only when necessary.

In reviewing these facts one is confronted with a series of questions. Will a reasonable proportion of these empyemas clear up by aspiration alone? How long is it justifiable to practice repeated aspirations as advocated by McEnery and Brennemann? In small children in whom the surgical mortality remains consistently high should we practice aspiration and defer surgery? Should all cases be operated upon

when the pleural exudate becomes thick, or should we postpone operation until aspiration fails to show a cure? With these questions in mind I collected some data on our own local results and have a few interesting cases to report.

My material consists of data collected from 41 cases of empyema under 8 years treated at 2 of our local hospitals in St. Joseph, Missouri. These hospitals are the Missouri Methodist and St. Joseph's Hospitals. They are both standardized institutions and keep fairly accurate records. Forty-one cases were studied. This number includes all cases admitted to the hospitals between March, 1928, and November, 1931. The cases were then collected consecutively and cover a period of 3½ years.

I have limited my report to children of 8 years of age or under because of the high mortality in patients at this age period. Thirty-two of these cases were treated by various surgeons of the hospital staff. It will be noted that 13 different surgeons had the care of these patients, so that this report should show a cross-section of surgical practice in private patients in an open staff hospital. The other 9 of these cases were treated by the author by repeated aspirations, and will be discussed later. These two groups of patients were seen in the same locality during concurrent periods of time. Variation in the virulence of the infecting organism was, therefore, minimized.

In the surgical cases the type of operation and method of drainage seem to vary with the individual surgeon and individual case. Eighteen of the 32 surgical cases had rib resections with open drainage, 8 cases had trocar thoracotomy with closed drainage, and 5 cases had a simple incision with tube insertion and open drainage. Two patients who originally had a closed drainage operation later had a rib resection.

Complications in these surgical cases were relatively few. Two cases developed an abscess of the chest wall, but these healed quickly. One case developed a pneumonia in the opposite lung. 1 case developed scarlet fever, and 2 cases had pyelitis. This makes a total of 6 complications and as noted above 2 secondary operations.

The average period of hospitalization was 20.3 days. Nineteen of these 32 patients were still discharging pus from a tube or wound on dismissal from the hospital. They were treated subsequently as ambulatory patients.

Table 1 gives a comparison of the ages of the patients treated by operation with the aspiration cases. Only 11 of the 32 cases operated upon were below 3 years. Most of the cases were operated upon late in the disease, only 11 cases being operated within the first two weeks of illness.

The mortality in these surgical cases was 3.12 per cent. Only 1 of these 32 cases died. He was an extremely ill, poorly nourished child of 14 months. He had been sick for over 2 months. He died the ninth postoperative day after a rib resection.

This mortality of 3.12 per cent seems very low for children under 8 years. It can be accounted for only by the facts that these cases were largely in the older age groups, were operated late in their illness after the pneumonia had subsided, and that the disease was unilateral. There were no bilateral empyemas in this entire number.

Nine of this series were treated by the author. Every attempt was made to cure these patients by aspiration alone, and to prevent surgery. This plan was adopted and adhered to until the condition of the patient demanded a change in procedure. These 9 cases were all frank empyemas. Each case gave a history of preceding pneumonia. A diagnosis of empyema was not made until thick pus had been drawn from the pleural cavity. Any patient from whom very small amounts of pus were obtained was not included in this discussion. These cases were all observed in a hospital for a given period of time, but some were treated and observed at home subsequently. The number and frequency of punctures depended entirely upon the clinical picture and the physical signs. No stated interval between punctures was practiced. When a patient exhibited a very large collection of pus it was at times thought best to withdraw only a part of this pus and the remainder at a later date. Removal of fluid by aspiration was usually followed by a decrease in temperature and some clinical improvement. When the patient showed evidence of a further

Table 1

AGES OF PATIENTS

32 Surgical Cases
- 1 case 12 months
- 5 cases between 1 and 3 years
- 5 cases between 3 and 5 years
- 13 cases between 5 and 7 years
- 8 cases between 7 and 9 years

18.7 per cent below 3 years. Mortality 3.12 per cent

9 Medical Cases
- 1 case 3 months
- 7 cases between 2 and 3 years
- 1 case 5 years

84.8 per cent below 3 years. Mortality 11.1 per cent

Table 2

Case	Age	Diagnosis	Date	Amount	Character	X-Ray	Result
1. O. P.	3 mos.	Pneumonia	11-21-29	100 c. c.	Milky	X	(2 punctures)
		Empyema	11-25	150 c. c.	Milky		
		Absc. foot		250 c. c.			
		Erysipelas					Died: erysipelas
		Syphilis	11-29				
2. D. G.	18 mos.	Pyopneumothorax	2-13-31	120 c. c.	Thick-creamy	X	Cured (4 punctures)
			2-16	50 c. c.	Thick-creamy		
			2-19	100 c. c.	Thick-creamy		
			3-7	75 c. c.			
				345 c. c.			
3. W.W.	24 mos.	Empyema	6-11-29	105 c. c.	Thick-green	X	Cured (6 punctures)
			6-13	75 c. c.	Thick-green		
			6-15	0			
			6-16			X	
			6-19	115 c. c.	Thick-green		
			6-22	100 c. c.	Thick-green		
			6-27			X	
			6-28	30 c. c.			
				425 c. c.			
4. L. N.	24 mos.	Empyema	5-6-30	300 c. c.	Thick-yellow	F	Cured (8 punctures)
			5-9	360 c. c.	Thick-yellow		
			5-31	480 c. c.	Thick-yellow		
			6-2	600 c. c.	Thick-yellow		
			6-12	240 c. c.	Thick-yellow	F	
			6-16	330 c. c.	Thick-yellow		
			6-23	100 c. c.	Thick-yellow		
			6-28	240 c. c.	Thick-yellow	F	
				2650 c. c.			
5. G. W.	24 mos.	Pneumonia			Thin green		
		Empyema	4-17-31	75 c. c.	Glass	F	(5 punctures)
			4-21	80 c. c.	Milky		
			4-28	60 c. c.	Milky		
			5-4	120 c. c.	Thick-yellow		
			5-12	60 c. c.	Thick fibrinous		
			5-13				Trocar-cannula closed drainage
				395 c. c.			
6. A. H.	24 mos.	Empyema	6-18-30	330 c. c.	Thick-yellow		(10 punctures)
			6-20	450 c. c.	Thick-yellow		
			6-23	440 c. c.	Thick-yellow		
			6-28	600 c. c.	Thick-yellow		
			7- 3	240 c. c.	Thick-yellow		
			7-11	410 c. c.	Thick-yellow		
			7-17	100 c. c.	Thick-yellow		
			7-25	275 c. c.	Thick-yellow		
			8- 2	185 c. c.	Fibrinous		
			8- 5	60 c. c.	Fibrinous	F	Operation: Incision Open drainage
				3090 c. c.			
7. J. R.	30 mos.	Pyopneumothorax	6-27	30 c. c.	Thick		
			6-28	450 c. c.	Thick	X	Wt. 28-9½; Hb. 80%
			7- 3	250 c. c.	Thick		R.B.C. 4,440,000
			7- 6	120 c. c.	Thick		
			7- 9	100 c. c.	Thick		
			7-13	650 c. c.	Thick		Steady improvement
			7-16	500 c. c.	Thick		Hospital discharge
			7-20	180 c. c.	Thick		
			7-29	210 c. c.	Thick		
			8- 3	200 c. c.	Thick		
			8-10	300 c. c.	Thick		
			8-14	240 c. c.	Thick	F	
			8-20	215 c. c.	Thick		
			8-29	200 c. c.	Thick	F	(17 punctures)
			9- 4	180 c. c.	Thick		
			9-24	175 c. c.	Thick	F	
			9-30	150 c. c.	Thick	XX	
				4150 c. c.			
			10-6-31		No symptoms except cough Few chest Phy. signs		Wt. 34-9; Hb. 85% R.B.C. 4,990,000
8. L. K.	36 mos.	Encysted empyema	3-23-28	100 c. c.	Thick-yellow		
			3-25	40 c. c.	Thick-yellow	X	Cured (5 punctures)
			3-26	0			
			3-30	100 c. c.	Thick-yellow		
			4- 4	0			
				240 c. c.			
9. R. C.	5-years	Pneumonia Empyema	3-30-31	360 c. c.	Milky		Cured (1 puncture)

collection of pus the puncture was repeated. These cases were all followed bacteriologically, and an attempt was made to collect serial x-ray plates. Since all of these patients were private cases it was sometimes difficult to get the proper cooperation.

In studying the report of McEnery and Brennemann an essential point was noted. Nine of their 33 cases showed a total amount of pus of 10 c. c. or less. This leaves a balance of 24 patients from whom more than 10 c. c. of pus were obtained. In the author's opinion the finding of such a small amount of pus in the presence of a pneumonia does not justify a diagnosis of empyema. We might be able to find a few c. c. of pus if we practised routine tapping in all pneumonias. At any rate, such small amounts of pus may be absorbed readily, and improvement following aspiration can not be ascribed to the aspiration *per se*. Most of these cases would get well without any interference. The main issue is as to whether large exudates may be aspirated with ultimate cure, and whether this gives better results than surgery.

A total of 58 punctures were done on these 9 cases. The largest number of punctures on any one patient was 17. One patient had only 1 puncture. The largest amount removed from any one patient was 4,150 c. c. and the smallest amount was 245 c. c. This gives an average of 203 c. c. per puncture. The dates and amounts of fluid aspirated are shown in *Table 2*.

The right chest was involved in 4 cases and the left chest in 5 cases. Bacteriologically, the pneumococcus was the cause in 4 cases, the streptococcus in 2 cases, pneumococcus and streptococcus in 1 case, and a negative smear and culture were obtained in 2 cases.

Three of these patients showed air in the thoracic cavity at some time during our observation. These cases with pyopneumothorax showed no variation over the plain empyemas. I agree with McEnery and Brennemann that pneumothorax was not associated with any disagreeable symptoms.

The ages of these cases varied from 3 months to 5 years. Seven of them were between 18 and 36 months.

The results in these patients may be summarized as follows:

Mortality	1 death	11.1 per cent
Cures	6 patients	66.7 per cent
Improved	2 patients	22.2 per cent
		100 per cent

The patient who died was a 3 months baby with the following diagnoses: congenital syphilis, pneumonia, empyema, abscess of the foot, and erysipelas. This patient died of erysipelas on the ninth hospital day.

Six of the 9 cases recovered fully without any further surgical procedure. Various periods of time have elapsed since these patients had their last thoracentesis. One case has been well for 3 years, and the last case has been examined recently, approximately a month since his last aspiration.

Two patients showed marked improvement through a series of aspirations, but were later turned over to the surgeon for operation. Both of these cases were extremely ill on admission and were very poor operative risks.

One case was first seen as a pneumonia. There was no cooperation and as a result he was not aspirated adequately. He was treated at home because of poverty, and he was not brought for examination at the proper times. After 5 punctures over a period of almost a month he was sent into the hospital as a charity patient and an operation was performed. The second patient who failed to get well on this treatment was treated adequately. Large amounts of pus were obtained from his chest every third to sixth day for a series of 9 punctures. On the tenth puncture the fluid was so thick that only 2 ounces could be withdrawn and a fluoroscopic view showed a massive collection of pus. His condition had improved greatly and operation quickly cleared him up. Both of these cases were much better at the time of operation than at first examination.

The improvement under this treatment was much more apparent than the data demonstrates. With the progress of aspiration the general condition of all these patients improved. Several cases were very poor operative risks at the onset of treatment and later were good operative risks.

Such a small number of cases does not permit any conclusions. However, some of these cases do demonstrate that massive pleural exudates may clear up entirely under repeated aspirations. This method of treatment will result in a cure in some cases, and those who fail to clear up by aspiration alone are in an improved condition for thoracotomy.

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DISCUSSION (*Abstract*)

Dr. R. R. Roberts, New Orleans, La.—We have had wonderful results from the method used at Charity Hospital in cases diagnosed empyema. We aspirate as low as possible in the cavity with about an 0.12 caliber needle. We go very close to the diaphragm, checking our position by percussion, auscultation and x-ray plates. Each time we aspirate we inject about three-fourths as much air into the pleural cavity as we take out pus. We measure the air. We have a stiff rubber tube connecting the trocar with a 50 c. c. syringe. If we inject too much air, as much air as we drawn out fluid, the child is in the same depressed condition as if it had fluid in the chest. Most of the mediastinal structures are pushed over, with the chest full of fluid. By injecting less, the patient is gradually relaxed and assumes a normal position. We have learned by experience not to put in much air.

Sometimes we find a thick fluid, with threads, that will not come through the syringe; and we take out what we can and inject the air and leave it for two or three days. Then we find the threads more dissolved and the fluid much more easily aspirated. Why they dissolve I do not know, but that has been our experience in 32 cases. In 32 cases we have never resorted to surgery, and we have lost only two.

We repeat these aspirations not according to x-ray plates, but by the physical signs of the patient. Anyone can determine these whether he is in town or in the country or has access to x-ray or not. The first thing we do is to watch the temperature chart. We know if the cavity is empty the temperature is practically normal, and as the cavity fills the temperature begins to rise. When it gets to 102 or 103° we know the cavity is filling up. We can check with x-ray plates, if it is desired.

We have three types of empyema. One is empyema in the lung cavity, the whole pleura being involved. Then we have walled-off empyema. If we draw off all the fluid we can, and the child still has temperature, we know we have encysted empyema or have missed a pocket. So we have to check our findings by percussion and x ray. We have to empty all the pockets completely if it is an encysted empyema. There are some plates out in Tulane's exhibit that demonstrate this very clearly, where the fluid level is above the pus, showing we have not emptied the cavity, and also where we have injected air into the cavity, pushing the mediastinal vessels over to the infected side, just as the pus would push them.

Dr. J. A. Danna, New Orleans, La.—Dr. Moore said he did not know anything about air replacement, but I should like to use one of his own pictures to show that he does know something about it. (Slide is shown.) Now, in this picture you can see the rigid wal's of this empyema cavity in exactly the same size and shape as before the cavity was aspirated. In other words, I believe that air entered the cavity in the interval between the taking off of the syringe to empty it of pus and its re-attachment to the needle. The fact is, however, that this cavity previously filled with pus is now completely filled with air. There is no therapeutic value in the air, but it is only by putting in the air that you can get out all the pus.

I should like to call your attention to one of the dangers of treating these cases by aspiration. I refer to the possible formation of a pressure pneumothorax. This may be brought about in one of two ways. First, a certain number of these patients have a bronchial fistula resulting in a spontaneous pneumothorax. In these cases the air which finds its way into the cavity may not be able to escape, in which event the pressure may gradually increase to such a point as materially to displace the heart and mediastinum toward the opposite side. Secondly, when repeated aspiration with replacement of an equal quantity of air is practised, if the aspirations are repeated before the air has had time to be absorbed the quantity of air actually present in the cavity increases at each aspiration and may eventua'ly reach a point where it will produce the same effect as a pressure pneumothorax from a bronchial fistula.

I recently saw a child of 5 years who had been aspirated a number of times, every third or fourth day, the same amount of air being introduced each time as the amount of fluid taken out. He was in great distress and his heart and mediastinum were displaced toward the other side. I removed 600 c. c. of air, which gave him a little relief, and suggested removing the same amount at three- or four-hour intervals later. Before the second aspiration had been done, however, a well-meaning intern gave him a transfusion, in the course of which he died. His right heart was already taxed to its capacity by the increased intrathoracic pressure and the transfusion was just too much for him.

In closing, therefore, let me emphasize the fact that though you may forget about your patient if you institute tube drainage, you must keep a close watch on him if you treat him by any method of aspiration. You must not only see him often, but have frequent roentgen ray check-ups and be prepared to meet serious emergencies if they arise.

Dr. L. R. DeBuys, New Orleans, La.—In the x-ray pictures it seems to me that we have a lead to guide us in the replacement of air. I have done a good deal of investigation of the shadows of the chest, and one thing we always watch is the tracheal line. The tracheal line gives us an idea as to whether the lung is pushed over in the instance of increased content in the thoracic cage on one side, or whether it is pulled

over, as we find in certain cases of atelectasis, post-inflammatory adhesions, and so on. The amount of air replacement is just right, whether it has been one-half of the fluid removed or two-thirds or three-fourths, or what not, if the x-ray shows that the tracheal line is in the mid-line of the patient. I offer this index as a possible guide to the surgeons in their air replacements.

Dr. Oliver W. Hill, Knoxville, Tenn.—For a number of years we referred all cases of empyema to surgeons, before we began to care for them ourselves. The surgeon invariably resected one or two ribs. Our mortality was terrific. Some years ago I heard Dr. Langley Porter, at the American Pediatric Society at West Baden, read a paper on repeated thoracentesis. We have used this method since and find that in very few cases where the child is seen early do we have to do a drainage by tube. We never do a rib resection.

One warning. In a case which Dr. Roberts, I believe, reported, 700 c. c. of fluid were drawn out the first time. There is great danger in that. The patient should be watched very closely, and if he shows the least sign of shock, wait a few hours before repeating the drainage. It is all right to wait twenty four hours. Usually we wait eight or ten hours. If a child is brought in terribly distended, the heart and other organs displaced and its respiration embarrassed, it is dangerous to attempt to relieve it by withdrawal of large amounts of fluid. Do it slowly.

When we withdraw fluid from the child's chest, if the pus is of the thick, greenish type, a smaller amount should be drawn out at one period than if the pus is thinner. We have to consider the type of infection. If we continue to aspirate those children after a while the pus will become almost sterile, showing little or no growth on culture media.

I agree with Dr. Moore that when there is high pressure on the venous system it is wrong to give a transfusion. If, however, the child is very toxic and you want to give some antibodies and the nourishment that blood supplies, you can inject 20 or 30 c. c. of the parents' blood intramuscularly with benefit.

If the operation is done, it should be very gently done, avoiding trauma and tension as much as possible. It should be postponed long enough to be certain that open drainage is essential to recovery, because our experience has taught us that a large per cent will recover without radical interference.

Dr. Robert A. Strong, New Orleans, La.—There is no question concerning the advantage of aspiration and air replacement over the more radical resection operation in the treatment of empyema in children. It has long been recognized that the more radical surgical procedure is borne very badly by young children. The mortality in different series has ranged all the way from 30 to 70 per cent. Even the surgeons have long since been convinced that open drainage is especially contraindicated in the early stages of streptococcic empyemas. For this reason preliminary aspiration has always been employed for the relief of intrathoracic pressure, preceding more radical surgical intervention.

It was frequently found that this preliminary aspiration relieved the patient so much that surgical drainage was often deferred, and the recovery of the patient occasionally obviated the necessity for operation.

In a series of 33 children reported by McEnery and Brennemann, in which the sole treatment consisted of repeated aspirations, the mortality was only 9 per cent. In other series among children the mortality has been even lower, but it is believed by those obtaining the lower mortality that they were dealing with a less virulent organism than in Brennemann's series.

In the series reported by Dr. Roberts, from the Department of Pediatrics of the School of Medicine of Tulane, the mortality was only two. The favorable results which have been obtained by this method of treatment indicate that the time has arrived when empyema is no longer to be regarded as a surgical emergency requiring operation as soon as it is diagnosed.

The simplicity of the technic and the relief which the method affords these little patients is most convincing evidence of the efficacy of the method. They usually experience little, if any, discomfort during the procedure, except in the infiltration of the local anesthesia, so they willingly and cheerfully submit to subsequent aspiration.

I do not intend to convey the impression that occasions do not arise when the more radical procedure must be necessary, but I do think that aspiration with or without air replacement is the method of choice in the treatment of empyema in young children.

Dr. Alexis F. Hartmann, St. Louis, Mo.—In the discussion of this paper so far it seems to me that the real point has not yet been made: if the patient has survived the pneumonia, even though he has developed empyema, the prognosis is still good. Children do not die of empyema provided the pus is skillfully removed, and it seems to make very little difference whether it is removed by closed drainage, by rib resection, or by aspiration. When the mortality figures are analyzed they are all about the same for the various methods. Death rarely results from uncomplicated empyema, but usually from meningitis, septicemia, erysipelas or some other complication.

Dr. Moore (closing).—The purpose in writing this paper was not to advocate thoracentesis in place of the usual surgical procedure in all cases. We merely tried to point out that in very young children surgery is associated with quite a mortality, and multiple thoracentesis may eliminate the necessity of surgery in many cases.

Dr. DeBuys called attention to a deviation in the tracheal line on some of the x-ray plates. This may be explained by the long recognized fact that there is a scoliosis of the spine in all long standing empyemas.

Dr. Roberts and Dr. Danna spoke of their experience in liquefying thick exudate by injecting air. Many of us have had the same experience when no air was injected. Sometimes the pus is too thick to come through a needle on one puncture, but a day or two later it is liquid enough to allow aspiration. Dr. Danna called attention to the fact that we had obtained a pneumothorax in several cases and attributed improvement to the air. The particular plates of our series used to demonstrate this were from those patients who had pyopneumothorax before they were punctured. Where there is a communication with a bronchus and an empyema cavity I cannot see how injected air could possibly be of any benefit.

PATHOLOGICAL CHANGES DURING THE EARLY STAGES OF VITAMIN A DEFICIENCY IN THE ALBINO RAT*

PRELIMINARY REPORT

By HARVEY S. THATCHER, M.D.,
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Until recently the main symptoms reported in vitamin A deficiency, experimentally produced in the albino rat, were loss of weight and xerophthalmia. It had also been observed that a great proportion of animals succumbed from pneumonia in this avitaminosis. Nephrolithiasis had been an important finding. It had also been demonstrated that metaplasia of epithelial structures occurred in various parts of the body, particularly in the respiratory and the genitourinary tracts and in the ducts of the salivary glands.

The purpose of this investigation was to find out at what stage of this deficiency disease metaplasia and infection began. A total of 77 albino rats were studied histopathologically, 53 of which were experimental and 24 of which were controls. Approximately 3,000 separate sections were examined, which included the following tissues: tongue, salivary glands, larynx, trachea, bronchi, lungs, thyroid gland, hypothysis, heart, suprarenals, ovary, uterus, tubes, testes, urinary bladder, kidneys, esophagus, stomach, small and large intestines, including the cecum, pancreas, aorta, thymus, lymph nodes, skeletal muscle, liver, skin, spleen, and bone marrow. The heart, suprarenals, kidneys, testes, liver and spleen were weighed. The rats were usually sacrificed as soon as the first signs of incipient ophthalmia appeared.

Tissues were fixed immediately after the gross examination in Zenker's solution or formalin. After the Zenker fixation they were stained according to Wolbach's modification of the Giemsa method. After the formalin fixation they were stained with hematoxylin and eosin.

It was found that even in the early stages of vitamin depletion (as evidenced by incipient signs of ophthalmia and during periods when even slight growth occurred) there developed metaplastic changes with definite regions of infection in the posterior portion of the tongue, in the ducts of the salivary glands, and in the respiratory tract. Atrophy of the spleen was a common finding.

One of us (H. S. T.) examined the tissues of a child who died a few days ago of bronchopneumonia, who was evidently suffering from vitamin A deficiency. The child was thirteen months of age and had been fed breast milk exclusively from an improperly nourished mother. Ophthalmia developed with corneal ulceration in the left eye. Metaplasia of a few ducts of the lingual glands with foci of subacute inflammation, metaplasia of a few ducts of the glands of the trachea, foci of subacute inflammation in the submaxillary gland with metaplasia of the ducts, hyperplasia of the lining of the pelvis of the kidney and bronchopneumonia were found. These changes pointed to the histological changes in vitamin A deficient animals.

We conclude from such observations that as a result of vitamin A deficiency changes in the epithelial structures in the respiratory tract of man may possibly begin before definite external symptoms are apparent, which later are responsible for respiratory disturbances such as are found associated with the common cold, acute bronchitis and bronchopneumonia.

DISCUSSION (*Abstract*)

Dr. Martha A. Wood, Houston, Tex.—Dr. Thatcher is putting down the stepping stones for further clinical knowledge. Nothing carefully worked out is ever a loss. He has done an enormous amount of pathologic work.

Dr. J. A. McIntosh, Memphis, Tenn.—I should like to ask Dr. Thatcher if he has gained an impression that vitamin A is pathologically destroyed in the body? Most of the data that is presented is along the line that there is a deficiency of intake of vitamin A.

Dr. Thatcher (closing).—Dr. McIntosh asks an important question. Of course, we know that the liver is the organ that stores most of the vitamin A. We have found in the liver a considerable fibrosis around the portal canal, but we did not find any other changes. We did not find the marked changes in the liver that we have found in animals suffering from vitamin B deficiency.

Dr. Sherman, of Columbia University, has recently stated that the American diet is greatly lacking in vitamins A, D and G. I believe if we examine more carefully more of our autopsy material, we might find that certain pneumonias are related to vitamin A deficiency.

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*Research Paper No. 239, University of Arkansas.

CYTOLOGICAL EXAMINATION OF THE NASAL SMEAR IN THE DIFFERENTIAL DIAGNOSIS OF ALLERGY AND INFECTION*

PRELIMINARY REPORT

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Coates and Ersner,[1] in a study of the cytology of 50 cases of paranasal sinusitis which were operated upon, found an abundant eosinophilia in the nasal membrane tissues of all of their nine cases of bronchial asthma, and none in the 41 non-asthmatics, quoting and confirming similar work done by Finck.[2] Eosinophils are, of course, also rather commonly seen in the blood stream in this and other allergic conditions.

In severe, seasonal cases of vasomotor rhinitis or hay-fever the history of the case and the appearance of the nasal mucosa are both so typical as to make diagnostic error impossible.

In chronic vasomotor rhinitis running throughout the year, and in cases of a mild type, that type so often seen accompanying bronchial asthma, especially when frank suppuration or other distinct nasal abnormalities accompany them, it becomes at times a matter of importance to determine whether allergy is the sole or even a complicating factor at all in the condition presented. This is due to the fact that numbers of allergic exciting factors are of a more or less constant, perennial and non-seasonal character, not immediately obvious from the history, and also not infrequently in themselves a source of polypoid conditions ordinarily assigned to chronic purulent infections. In this connection it is also rather generally admitted that shadow densities on the roentgenographic films of the paranasal sinuses caused by swollen allergic mucosa simulate perfectly, except during periods of recession, those caused by frank inflammatory processes. Nasal biopsies that would assist in this matter are as yet uncommon and are attended with a certain amount of inconvenience to operator and patient.

Mention of eosinophils in the nasal discharge of hay-fever and asthma cases has been made by Eyermann,[3] Hansel,[4] Pressman[5] and others. The purpose of this study has been to endeavor to determine the frequency and the diagnostic reliability with which eosinophilic nasal tissue infiltration could be determined by an examination of the attending nasal discharge in a manner quickly and easily made by the average laboratory technician. Thick and thin smears were tried, also various slight stain modifications. The method of securing material direct from the nose by cotton or metal applicators and smearing it on slides was found too often to break or crush the individual cells, making microscopical identification and counting difficult. For this reason, in all but our earlier cases, the material for examination was secured by having the patient blow the nose into a small handkerchief of cellophane. From the discharge so secured a thin smear was carefully made, fixed by heat, and then stained as usual by Wright's method, precisely as staining is done for a differential blood count.

The discharges were invariably secured before any possibility of modification by mechanical manipulation, medicated sprays or packings, and as far as possible only during periods of apparent allergic activity, not during intervals of quiescence. It was soon noted that forcible attempts at blowing, with a practically completely blocked nose, seldom gave anything but scanty unsatisfactory cell recovery. It was also soon learned, much to our surprise, that the extremely profuse discharge of perfectly obvious, typical, violent hay-fever was often practically entirely watery or mucoid, containing no cells whatsoever, and diagnosis had to be made by other methods. Failure in this type of case is of little moment, as the diagnosis by nasal mucosa inspection can be immediately made without difficulty. We have no reason to offer for this surprising failure of nasal smear eosinophilia in these severe cases. No biopsy work was done.

The cases on which this report is based were such as occur routinely in the office of a practice limited to allergy. The diagnoses of allergic rhinitis were confirmed either by the subsequent history, positive skin reactions to causal allergic factors and favorable response to treatment by common allergic methods, or by direct nasal examination by competent specialists. In this connection we desire to acknowledge especially the courtesies of Drs. C. J. Boehs, A. N. Champion, R. E. Parrish, E. D. Dumas and Belvin Pritchett.

Inasmuch as our intent has been to determine solely the practical diagnostic value of a method

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that would require only a few minutes of time, few differential cell counts were made, the eosinophils being reported usually as few, many or predominating, anything around 3 or 4 per cent being considered few and abnormal. In typical hay-fever of not extreme severity, counts of as high as 80 and 90 per cent were not uncommon. No attempt was made to determine the significance of the various non-eosinophilic cells encountered, such as lymphocytes or squamous epithelium.

Total number of cases	97
Total number of allergic cases	87
Proven hay-fever cases	
Many or predominating eosinophils, 10 to 90 per cent	50
Few eosinophils, 3 to 10 per cent	9
No eosinophils	14
(Of these 5 gave eosinophilia on second examination)	
Quiescent hay-fever cases (out of season)	4
No eosinophils	4
Proven acute infections in known allergic cases	
Many pus cells with few or no eosinophils	8
Many pus cells with many eosinophils	2
Controls	
Non-allergic cases	10
No eosinophils	10

The condition of nasal allergy does not bar acute respiratory infections. During such intercurrent infections the nasal smear cytology, as might be expected, changes. In 10 hay-fever cases with "colds" the previous usually high eosinophilia was completely replaced by a pure non-eosinophilic polymorphonuclear cytosis, eosinophils completely disappearing for the time being; in 17 others, from 5 to 40 per cent of eosinophils accompanied the non-eosinophilic polymorphonuclear cytosis. In several of these cases, during the early "cold" stage, cells were very scanty.

Also, a state of unmistakable nasal suppuration does not bar complicating intermittent or chronic allergy. Both conditions, as is seen from the above figures, may alternate in the same individual and at times coexist. In fact, there is the decided possibility that the allergic irritation and its attendant drainage blockage may be primarily responsible for the suppurative condition later or coincidentally found. Clinically, in many cases of this type, in order to secure relief, attention will have to be given in both directions.

At times, too, as was true in several of these cases, almost a purely eosinophilic cell count is seen in an apparently obvious suppurative inflammatory process, such cases yielding to allergic measures alone. Hence the value of a simple test such as we have described that will often reveal the actual pathology.

As controls, the nasal smear was examined in 10 individuals with acute or chronic upper respiratory tract infections, individual non-allergic in every particular, all showing some or an abundant polymorphonuclear cytosis without eosinophils.

The practical clinical diagnostic value of this simple routine test is shown by the following cases:

Case 1.—Mrs. C. H. L., age 51, a housewife, was first seen January 6, 1931. This patient gave a history of repeated colds with considerable sneezing and a nasal blockage and "catarrh" over a period of many years, in fact since childhood. These so-called "colds" were continuous or nearly so for months at a stretch, and were usually attended with a dry, hacking cough. While there were no distinct seasonal exacerbations, the condition was always worse in winter, never, however, clearing to any great extent even in the summer months. The condition was always worse on arising in the mornings. Years of local nasal treatments, two tonsillectomies and a nasal septum resection operation had given no relief whatsoever. She had lived in Missouri, New York, Pennsylvania and Texas without change in symptoms in any place of residence.

The possibility of nasal allergy was considered in this case by Dr. C. J. Boehs, who had done some of the operative work. Intradermal tests with common pollens, animal hair and other common air borne allergens were practically negative even when worked up to 1:50 dilutions. Ophthalmic tests with pure pollens were also negative, the usual diagnostic methods of ordinary hypersensitivity thus failing completely. Under usual circumstances, this case would have been referred back as non-allergic. The nasal discharge smear, however, showed not only pus cells, but also many eosinophils. The finding was confirmed by 11 per cent of blood eosinophilia.

As a trial, feathers, animal hair and other common inhalant allergens were removed from this patient's environment and intradermal treatment instituted for the current local seasonal pollen (mountain cedar). As a result, improvement was almost immediate, and in eighteen days all nasal symptoms completely cleared for the first time in years.

Case 2.—R. R. L., age 35, a minister, was first seen January 31, 1928, immediately following his first attack of bronchial asthma. He gave a history of protracted nasal symptoms over many years diagnosed as sinusitis, not relieved by much local nasal treatment and operative work. He was the father of an asthmatic child. His skin tests were slightly positive. Pollen treatment was then instituted and maintained each succeeding year with perfect results both as to asthma and nasal symptoms.

During the midwinter of 1930-31 the patient showed some asthma for the first time in years, asthma that was naturally ascribed to error in treatment technic or to the overlooking of some new specific allergen. Following the close of the cedar pollen season in early February, 1931, nocturnal asthma persisted, necessitating one and occasionally two doses of epinephrine for relief. No environmental changes could be detected.

A nasal smear taken February 20, 1931, showed many pus cells and absolutely no eosinophils. Nasal examina-

tion by Dr. Belvin Pritchett then revea'ed distinct sinus infection. Ten local nose treatments directed to this point were followed by complete asthmatic relief. In this instance, in the asthma which had previously been of pure specific pollen hay-fever etiology, the nasal smear containing no eosinophils was the determining step in uncovering the actual immediate etiological diagnosis and permitting the institution of proper treatment in an asthma which for the time being was the result of mechanical irritation of paranasal sinus bronchitis ("bacterial" asthma?).

From even this small number of examinations, we feel safe in drawing the following conclusions:

(1) A positive eosinophilic smear of from 20 to 90 per cent is definitely diagnostic of allergic rhinitis.

(2) A positive eosinophilic smear of from 4 to 8 per cent is highly suggestive of allergic rhinitis.

(3) Conditions such as pure, thin, watery, non-cellular, mucoid discharge, quiescence, acute infection showing no eosinophilia in definite allergic individuals is proof that the absence of eosinophilia does not bar allergic rhinitis.

(4) Allergy and nasal infection may exist coincidently or at alternate periods in the same individual.

(5) This simple eosinophilic nasal smear test is of decided practical diagnostic value.

Owing to the limited number of cases seen, two questions still remain unsettled in our minds.

First, can chronic purulent sinusitis *per se* and without an allergic basis or complication ever produce a high or even noticeable eosinophilia? From our limited number of cases, and Coates and Ersner's[1] studies, apparently not.

Second, is it possible for a vasomotor rhinitis produced by the irritation of mechanical impingement (septum, turbinates, spurs) to produce nasal smear eosinophilia without concomitant allergy? We have been unable to locate so far any quoted cases of this type in the literature. We have two incomplete cases, both in allergic families, both clinically relieved by septum resection, but too recently to note the permanence of the results.

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DISCUSSION (*Abstract*)

Dr. J. A. McIntosh, Memphis, Tenn.—Eosinophilia is the cellular expression of hypersensitiveness. It is helpful in differential diagnosis. If Charcot-Leyden crystals are present, moist fresh material will reveal them. They confirm the presence of eosinophils in the mucosa and are constantly associated with them. The eosinophil must degenerate for them to form. The physical properties of mucus aid in their formation.

Dr. Kahn brings out the intermittency of the eosinophils in the discharge. This is like the disease itself. The cell picture is a mirror of allergic disease.

I have already tried Dr. Kahn's nasal smear and cellular count with one little modification: we have the patient blow the nose into the Petri dish and obtain the smear from this material. We first look at the moist mount with dark field condenser, dry, and then stain it after the usual fashion of blood smears.

We think Dr. Kahn has called our attention to a very useful laboratory procedure. It does not take long to execute it and we believe it is worth while.

Dr. N. F. Thiberge, New Orleans, La.—I should like to ask Dr. Kahn whether he has found that the symptoms were in proportion to the amount of eosinophilia present? We all know in allergic conditions that the skin reaction fluctuates, in some cases giving a history of an acute attack of hay-fever or asthma. We are sometimes surprised to find a negative skin reaction, a frequent occurrence in the seasonal form of acute attacks.

On the same basis we can explain some cases in which the allergic symptoms were marked, and yet there was no eosinophilia in the discharge.

The eosinophilia, in my opinion, is an expression of a local allergy.

I have no personal experience with Dr. Kahn's test, but from my experience with the skin test it appeals to me, not only as a test for local allergy, but also as a prognosis for quick recovery. It may show that the patient is developing his resistance quickly and we can predict for him a short attack. It is recognized that the swelling of the nose in an allergic condition is one of the ways of arresting the pollen; the more completely the block, the less local symptoms there are and the less local discomfort. Hence I should think that the test would be a very excellent one for the presence of local allergy and the prognosis of its quick recovery.

Dr. B. G. Efron, New Orleans, La.—Many times eosinophils have been found in a nasal secretion, but no one has taken the trouble to learn their significance. I believe that this test will find its greatest use in cases of rhinitis, and in these cases it will be found to save much useless nasal surgery, because the case will be correctly diagnosed as nasal allergy, and in those cases where we find that the skin tests are of no great use to us and that we are dealing with allergy, diet and other methods will be used. It is really remarkable in the length of time that allergy has been considered, that allergy has been investigated while vasomotor rhinitis has not.

Dr. Emmerich von Haam, New Orleans, La.—The role the eosinophils play in the organism is not very clear. Very interesting seems the fact that the eosinophils in the blood disappear completely for several hours following the injection of splenic extracts.

I have made the same observation as Dr. McIntosh. In many sections of appendices, whose mucous membrane shows only very slight signs of inflammation, a great number of eosinophils can be seen. Those cases usually give the history of an acute attack of appendicitis.

Dr. Charles W. Duval, New Orleans, La.—Eosinophils, in the nasal secretion, as Dr. Kahn said, are diagnostic of allergy or an allergic condition of the tissues. I am not willing to accept eosinophils as an indication or a sign of allergy or allergic tissues for the body in general.

Dr. von Haam spoke of appendices which show eosinophils, a group that show many eosinophils and a group that do not. We are familiar with the fact that the Fallopian tubes and other portions of the body show a great number of eosinophils. We are also familiar with Hodgkin's disease, in which the tissues are literally seething with eosinophils. I am quite familiar with the so-called allergic nephritis: there we do not get any eosinophils whatever. So I can not accept, and I do not think that any of us should accept, the eosinophil as a pathognomonic sign histopathologically of an allergic tissue. We all know that eosinophils are attracted to the various lesions in the body. Just why they are, just what calls them forth, we do not know. We are familiar with eosinophils in chronic inflammatory conditions that we know are not allergies, and for that reason, if for no other, we should be slow in accepting eosinophils as a diagnostic sign of an allergic tissue.

Dr. Kahn (closing).—The purpose of this paper was merely to determine the practical diagnostic value of the routine examination of the nasal smear in the differential diagnosis between allergy and infection. As our present knowledge of the function of the eosinophilic cell is but slight, no attempt has been made to explain the conditions governing its presence. The paper does, however, call attention to the fact that while the presence of eosinophilia is highly indicative and almost proof positive of the existence of nasal allergy, its presence does not necessarily rule out concomitant infection. Also, the test is by no means infallible. The paper shows that its absence in cases of undoubted allergy does not by any means rule out the diagnosis of nasal allergy and calls attention to several conditions in which such absence almost consistently occurs. For this reason it is absolutely incorrect to make the statement, "No nasal eosinophilia, no nasal allergy."

Our limited findings, however, do indicate that this simple test done routinely is of decided diagnostic value and will ordinarily differentiate the two conditions of infection and allergy as far as the nose goes, and indicate to a certain degree the proper line of therapy to be followed. Further work is being done in order to see whether the percentages found so far can be corroborated.

While it is true that liver extracts produce at times an increased blood eosinophilia, we know of no work calling attention to any benefit from their use in allergic conditions.

CHORIOEPITHELIOMA and HYDATIDIFORM MOLE: REPORT OF FOUR CASES*

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Because of the close relationship between chorioepithelioma and hydatidiform mole, the two may be described together. Histologically they are the same, the difference being in the degree of the pathological condition.

Definition.—"A chorioepithelioma is a malignant neoplasm originating from the epithelium covering the chorionic villi of the placenta with undue proliferation of Langhan's and syncytial cells, characterized by easily provoked hemorrhage and widespread metastases. Hydatidiform mole is a disease associated with pregnancy in which the chorionic villi are deformed in structure with undue proliferation of Langhan's and syncytial cells and presenting a mass of translucent grape-like vesicles and varying size, from pin point to 4 cm. in diameter."

Histology of Normal Placenta.—Placental chorionic tissue is composed of myriads of villi and intervillous spaces or vacuoles filled with blood. The villi dip down and even penetrate the decidual layer of the uterus, forming a meshwork of intercommunicating processes with the uterus. Each villus is composed of a central portion of connective tissue, a vein and artery, which are covered with a layer of cells called Langhan's cells. Covering Langhan's layer and lining the intervillous spaces or vacuoles, is another layer of cells called the syncytial layer. These structures are fetal in origin. At the site of contact of the fetal and maternal tissue structures, a fibrinous layer, Nitabuch's membrane, becomes interposed.

Histopathology.—The histopathology, as given by Schmitz, of a typical chorioepithelioma is quoted:

"The typical malignant chorioepithelioma is composed of both epithelial cell elements of the chorion. They assume embryologic morphologic characters and biologic activities. The cells form masses and columns with marked vacuolation and necrosis. One or the other cell type may predominate. The connective tissue core disappears entirely as a result of the proliferating activities of the epithelium. Mucous degeneration in the epithelial cells leads to the formation of vesicles. Fetal capillaries are absent. Syncytial wander cells are often seen in the maternal tissue.

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"The syncytial and Langhan's cells are in active proliferation, have many mitotic figures and show marked anaplasia. The highest potential malignancy seems to be conferred by the presence and activity of Langhan's cells. There is invasion by active penetration of the vascular sinuses and destruction of the adjacent tissue. Metastasis takes place by emboli in blood vessels locally and distantly. The growths and metastatic foci cause the formation of a zone of reaction of the maternal tissues against the invasive malignant cells. It is composed of round and plasma cells, leucocytes and fibroblasts."

Origin.—In the early days of histologic study of chorioepithelioma there arose numerous theories as to its origin, which led to considerable confusion among writers.

Theories of Origin.—(1) Sanger, who was the first to describe the growth, and Chiari and Pfeiffer thought that it arose from the decidua and hence was maternal in origin. They classified it with the sarcomata.

(2) Whitridge Williams first thought that the disease arose from the syncytial layer and that this layer was a maternal structure, and consequently agreed with Sanger that the tumor was maternal in origin.

(3) Gottschalk, in 1894, was the first author to advance the theory that the disease was fetal in origin. He thought that the syncytial layer was maternal and played no part in the formation of the tumor, but that it originated from Langhan's layer and the stroma of the chorionic villi of the placenta which were fetal structures. He classified it with the sarcomata.

(4) Fraenkel and Durante agreed with Williams that the tumor arose from the syncytial layer, but differed with him as to the origin of the syncytium. They thought that the layer arose from fetal structures and therefore the disease was fetal in origin.

(5) Gebhard concluded that the tumor was composed of both syncytial and Langhan's layers and that the former were maternal and the latter fetal structures, and that the tumor had its origin from both mother and fetus.

(6) Marchand, Haultain and later Williams recognized the syncytial and Langhan's cells as the histological elements forming the tumor and recognized that both layers were fetal in origin and that the disease originated from the chorionic villi of the placenta.

Marchand published his observations in 1895 and divided chorioepithelioma into two classes, typical and atypical, with transitional types between. The typical is characterized by an invasion of syncytial and Langhan's cells reproduced as they occur in early pregnancy. The atypical is characterized by an infiltration of the uterine musculature with syncytial cel's and an absence of Langhan's. He thought that there was very little difference in the malignant nature of the two types. However, he recognized the early widespread metastases of the typical and thought the atypical caused more local disease. Schmach differed from Marchand as to the malignancy, and observed that the literature indicated that practically all cases dying of general metastases were of the typical class.

(7) In 1910, Ewing attempted to group them according to histologic appearance as to malignancy or benignity, and thus establish a criterion for treatment. He divided the typical class of Marchand into benign adenoma and very malignant choriocarcinoma. He also divided the atypical class into two groups, syncytioma and syncytial endometris.

(8) Geist, the most recent author, agrees with Ewing that Marchand's atypical tumor is benign, although it may be fatal from accidental reasons. He does not think that Ewing's syncytial endometritis should be classed as a tumor or an inflammation, but regards it as syncytial hyperplasia. He regards Ewing's syncytioma as a transition between a syncytial hyperplasia and a true chorioma, and as representing the first step in the formation of a true neoplasm. He does not think Marchand's typical chorioepithelioma should be subdivided into chorioadenoma and choriocarcinoma according to Ewing's division. Geist's views are accepted by the majority of pathologists of today and are, with slight modification, a reiteration of Marchand's observations.

Frequency.—That chorioepithelioma is rare is evidenced by the fact that only 571 cases have been recorded. Teacher thinks, however, that a large number of cases are incorrectly diagnosed as retained placenta, sepsis, or sarcoma. It is also possible that a large number of early cases are incorrectly diagnosed as abortion, incomplete abortion and submucous fibroid, and late cases in the absence of microscopic study as "cancer." The incidence of the disease differs in different countries and at different times according to Lynch. Among 2,700 autopsies in the general hospital of Vienna 7 cases were found, while in Budapest not a single case was found by the pathologists who searched for years for such cases. In Belleview Hospital, quoting from Onslaw Gordon's paper, Douglas Symmers, Director of the Belleview Laboratories, states that during the past eleven years there have been approximately 8,000 autopsies and more than 35,000 surgical specimens revealing but one chorioepithelioma. Gordon thinks that while chorioepithelioma is very rare, hydatidiform mole occurs much more frequently than reports show. In Belleview Hospital, out of 4,500 abortions, 21 cases of moles were diagnosed. F. L. Velasco reported in the *Journal of the Philippine Islands Medical Association* 40 cases of hydatidiform mole in his maternity service from 1911 to 1920. Ninety-five per cent of the patients had intestinal parasites. Arthur Meyer, according to Lynch, found 8 cases in the first 2,089 uterine abortions in the Mall collection, or one in 261 abortions. Meyer states that hydatid degeneration is not uncommon in early abortions. Onslaw Gordon states that "it is of vital importance that the profession should appreciate the comparative frequency of hydatidiform mole, for by this understanding only can we outline a proper treatment of the condition and only by

an understanding of its frequency can we appreciate its relation to chorioepithelioma." There are no definite figures to show the percentage of moles that become chorioepithelioma. In Findley's series of 500 cases, 31.4 per cent developed chorioepithelioma, while of Hitschman and Cristofoletti's 200 cases, only 7.5 per cent became chorioepithelioma. Hertzler, in his book on "Treatment of Tumors," states that 50 per cent of hydatid moles become chorioepithelioma.

Etiology.—(1) Chorioepithelioma is a disease of fertile women. A pregnant uterus of one type or another antedates practically every typical growth, the incidence increasing with increasing pregnancies. According to Teacher, the peak is reached at the age of thirty-three.

In Pallosson and Violet's 455 cases, 45 per cent followed hydatidiform mole, 30 per cent followed abortion, 21 per cent followed labor at term and 2.5 per cent followed ectopic pregnancy. In Teacher's 186 cases, 36.6 per cent followed hydatidiform mole, 31 per cent followed abortion, 28 per cent followed labor, and 4.4 per cent followed extra uterine pregnancy. In Hitschman and Cristofoletti's 240 cases, hydatid mole antedated the growth 116 times, or in 48.3 per cent of cases; abortion 73 times, or in 30.4 per cent of cases; and normal labor 51 times, or in 21.3 per cent of cases.

(2) Chorioepithelioma may exist primarily and independently of pregnancy only as a pathological curiosity. A few cases of the disease in the male have been reported.

Rene Jeanneret reported two cases in the male. Tansey and Utz reported a case. They refer to an article by R. M. Hanfield-Jones which appeared in the *British Journal of Surgery* on "Choriocarcinoma of the Testicle," which concludes with a complete up-to-date list of 109 cases, 30 per cent of which showed no evidence of teratoma. Tansey and Utz's case was primary in the lung. Anna Hiege reported a case of primary chorioepithelioma of the liver. Divitski reported a case occurring in a virgin seventy-five years old and one in a woman fifty-eight years old is on record. These cases are regarded as belonging to Marchand's atypical class.

(3) Ovarian cystomata are frequently associated with hydatidiform mole and chorioepithelioma. Schmitz states that lutein cysts of the ovary are present in from 10 to 20 per cent of hydatidiform moles and chorioepitheliomas, which regress when the primary lesion is removed. In Onslaw Gordon's report, Coventry is quoted as saying that these cysts are found in 90 per cent of chorioepitheliomas and 80 per cent of hydatidiform moles.

Symptoms.—The symptoms of a hydatidiform mole may be summed up as follows: (1) history of pregnancy; (2) size of uterus all out of proportion to the time of pregnancy; (3) uterine pain; (4) hemorrhage; (5) abortion with the expulsion of a mole.

The symptoms of chorioepithelioma, which in 50 per cent of cases follows hydatidiform mole, were described by Sanger and given in the paper of Henry Schmitz as follows:

"(1) History of a preceding labor, abortion or the expulsion of a hydatidiform mole; (2) persistent hemorrhage from the uterus continuing after a curettage; (3) hemorrhagic putrid discharge and secondary infection following intrauterine instrumentation; (4) progressive enlargement of the uterus; (5) rapidly progressing anemia and cachexia; (6) early metastases, especially in the vagina and lungs, with cough, dyspnea and hemoptysis; (7) rapid course with death within six to seven months."

Diagnosis.—The diagnosis of hydatidiform mole is based upon (1) the history of pregnancy with more or less hemorrhage; (2) enlargement of the uterus out of proportion to the time of pregnancy; (3) the expulsion of the mole; and (4) positive Aschheim-Zondek test.

The diagnosis of chorioepithelioma is more difficult. However, a history of symptoms as outlined by Sanger, and positive microscopic findings in scrapings from the uterus are conclusive. A negative report from the microscope should not be considered conclusive evidence against the presence of chorioepithelioma since small localized lesions may be missed by the curette.

The diagnosis of hydatidiform mole and chorioepithelioma has been aided by a study of biological reactions by Zondek and Aschheim, Evans and Smith. Their study is based upon the assumption that in hydatid mole and chorioepithelioma lutein cysts of the ovary are formed due to the action of some hormone on the ovaries. They concluded that this hormone came from the anterior pituitary body. They have shown this formation of lutein material after the implantation of anterior pituitary and ovarian substance in animals. Murati and Adachi produced the same results with placenta. Karl Ehrhardt found in one case of chorioepithelioma 260,000 mouse units, and in another as high as 520,000 mouse units in one liter of urine, while in a normal pregnancy there are no more than 8,000 to 10,000 mouse units to a liter of urine. Aschheim states that the urine of patients with hydatidiform moles and chorioepithelioma gives a pregnancy reaction in mice about twelve times stronger than that obtained in two months gestation. It is claimed by the author that these tests are 98 per cent perfect in diagnosing pregnancy and hydatidiform mole and chorioepithe-

lioma. Since these biologic tests have been simplified and are easy of execution, the author thinks the reactions are great aids in the diagnosis of chorioma. Dr. Emil Novak, in discussing Schmitz's paper, states that there is no field in gynecologic pathology in which mistakes are made more readily than in this one class, because the histological findings in chorioepithelioma are almost identical with those found in normal pregnancy and in benign hydatidiform mole.

Two cases of hydatidiform mole coming under the author's observation gave a positive reaction to Aschheim-Zondek test after curettage. One was hysterectomized later for chorioepithelioma and the other is under observation at present. Sternberg states that the test was 99 per cent positive in all cases of chorioepithelioma studied in his work. Gerritzen reports a case of metastatic chorioepithelioma positively diagnosed by the Aschheim-Zondek test. This test is not only a valuable aid in diagnosing hydatidiform mole and chorioepithelioma, but serves as a wonderful guide in prognosis. It is positively proven that the primary metastatic lesion will give a positive reaction as long as any of the cells remain potent either after surgical or irradiation treatment, and only after the reaction becomes negative is a cure assured.

Treatment.—The treatment of hydatidiform mole depends upon the stage at which it is diagnosed. In the early stage before the uterus is invaded deeply by syncytial and Langhan's cells, thorough curetting of the entire endometrial surface of the uterus will destroy the growth. Every case, however, should be kept under close observation for years, since moles recur repeatedly, in which case a hysterotomy should be done in young women and the local lesions sought and destroyed. In elderly women, a hysterectomy should be done. Radiation is receiving considerable attention today and is applicable in recurrent cases. J. L. Rawls used radium with good results in a case of hydatidiform mole. In chorioepithelioma the uterus should be removed, followed by radiation of the metastatic lesions. However, it has been shown that removal of the primary lesion cures metastatic lesions. Six of Schmitz's cases received either radium or x-ray or both.

Nicolson used radiation postoperatively in his case. Dr. Neel, in discussing Novak's paper, reported a case in which he obtained good results with radium. H. C. Mack, of Detroit, believes that radiation is indicated. Dr. Novak advises radium in suspicious cases if radical surgery is not undertaken. Onslaw Gordon thinks radium and x-ray are valuable aids in treatment.

CONCLUSIONS

(1) Hydatidiform mole is much more common than is diagnosed.

(2) It is a forerunner of chorioepithelioma.

(3) A thorough microscopic study should be made on all tissue expelled during abortion, full term labor, or of a mole.

(4) In recurrent moles after curettage in young women, hysterotomy should be done or intrauterine implantation of radium should be resorted to. In elderly women hysterectomy should be done.

(5) In chorioepithelioma negative microscopic findings from uterine scrapings should not be considered in making a diagnosis.

(6) In chorioepithelioma it has been shown that the removal of the primary lesion cures metastatic lesions.

(7) Hysterectomy should be done early in every case of chorioepithelioma and may be followed by radiation.

(8) Aschheim-Zondek tests furnish valuable aid in diagnosing hydatidiform mole and chorioepithelioma and are of inestimable value in prognosis.

CASE REPORTS

Case 1.—Mrs. W. R. W., age 24, primigravida, was delivered on April 13, 1925, of a full-term live baby. Her puerperium was normal for six days. On the sixth day she had a very severe hemorrhage. The nurse reported her condition to an intern, who found her in a state of collapse from loss of blood. He quickly packed the uterus and administered fluids and stimulants. She was seen by me shortly afterwards and was found to be reacting fairly well. The hemorrhage was controlled. Twenty-four hours later she was given a transfusion of whole blood, and the packing was removed. She began bleeding again and continued to bleed abnormally for two weeks. On April 25 she was taken to the operating room, a bivalve speculum was introduced into the vagina and the cervix inspected. It was open and discharging pale blood. The cervical canal was dilated very easily and at the internal os a mass was found attached firmly to the wall of the uterus. The mass was removed with difficulty, having embedded itself into the uterus. The base of the growth was cleansed thoroughly with a curette and the patient returned to her room. The hemorrhage ceased and gave no further trouble. The mass, mole-like in character, was 2 by 3 cm. in size. It was rather irregular in outline and presented the appearance of placental tissue. It was very friable, spongy and soggy with blood. This growth was present during pregnancy and was probably due to a twin pregnancy, which did not degenerate until the uterus was

emptied. She also presented a picture of metastases in the lung. During the latter months of her pregnancy she was dyspneic, cachectic, and anemic. Evidently the metastatic lesions regressed after the removal of the growth, since her general health improved and she was well the last time she was seen four years later. A microscopic examination was not done. The patient was not subjected to hysterectomy on account of her poor condition.

Case 2.—Mrs. W. J. M., age 22, primigravida, on January 14, 1927, came under my observation and gave a history of about five months' pregnancy. Her last menstrual period was August 25, 1926. She had several bleeding spells at about two months intervals. An examination was done and a uterus the size of a five months pregnancy was found. No fetal parts or movements were observed. On February 22 she had a hemorrhage and was put to bed for observation. The hemorrhage was partially checked after three days, but started again in two days, and on February 27 labor pains began, accompanied by severe hemorrhage. She was seen by me and found to be bleeding severely. Vaginal examination was done and a large mass was found in the vagina. The mass was removed and found to be covered with blood. Upon examination it was found to contain a large number of clear vesicles, presenting the appearance of pods of grapes. A diagnosis of hydatid mole was made. No fetus was recovered. The mass was taken to Dr. A. J. Ayers' laboratory and he confirmed the diagnosis. The patient was thoroughly curetted and made a normal convalescence. She left town and on January 1, 1928, I received a letter from Drs. Aves and McLarty, of Galveston, Texas, saying she had come under their care and that they had made a tentative diagnosis of malignancy of the uterus. They did not state what type of malignancy. It was probably a chorioepithelioma.

Case 3.—Mrs. L. S., age 24, was secundigravida. The first pregnancy was normal five years previously. On January 21, 1930, the patient's menstrual period was expected, but she passed only a small amount of blood. The next month she passed about the same quantity at intervals of two or three days for two weeks. On April 14 she was examined and found to have a uterus the size of a four and one-half or five months pregnancy. Four days later I was called to see her and found that she had aborted. She had been bleeding very freely. The material passed was destroyed by her husband before I arrived. She thought she recognized a fetus. However, the husband did not. In one week she was out again and made a visit to the office. The uterus was large, but not bleeding. Two days later she noticed some blood when she stood on her feet. On May 21, which was thirty days after abortion, I was called to see her and found that she had passed another mass. Her husband saved the specimen this time. As before, the flow was more than normal. The specimen consisted of a mass about the size of the first, very soft, friable, spongy and soggy with blood. It was taken to Dr. Leadingham for examination and he reported it to be a hydatid mole. In view of the fact that this second mole followed closely upon the other, it was decided that the growth was very rapid and that a radical operation should be done. A complete hysterectomy was done on May 22. The uterus was examined by Dr. Lake, who made the following report: "There is a large blood clot attached to the left side of the uterine cavity. Beneath the blood clot there is a soft mole-like growth which extends down into the uterine mucosa. A microscopic study of a section of the tumor shows numerous syncytial and Langhan's cells, blood vacuoles and necrotic areas. Diagnosis: chorioepithelioma." The patient is well at the present time.

Case 4.—Mrs. W. A. H., age 29, married 11 years, was multigravida 4. The youngest child was five years old. All births were normal, no contraceptives had been used, and there were no miscarriages. The last period was June 18, 1931. She was examined August 5. The uterus was enlarged to the size of a three months pregnancy. It was boggy and retrodisplaced. It was pushed out of Douglas' pouch. The cervix was eroded. The patient was advised to take knee chest exercises and return to the office in three days, at which time an examination was done and the uterus was found to be in the normal position. On August 29 she aborted and the mass which she passed was saved and inspected very closely. No fetus passed. A diagnosis of hydatidiform mole was made. She was curetted and another mass the size of the thumb was removed. A microscopic study of this specimen was done by Dr. Lake, who reported hydatidiform mole. At the time of operation a catheterized specimen of urine was obtained and an Aschheim-Zondek test was done, which was positive. She is at present under observation.

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DISCUSSION (*Abstract*)

Dr. John C. Culley, Oxford, Miss.—The rarity of chorioepithelioma is, as Dr. Beasley states, evidenced by the fact that few cases have been reported. It is possible, however, that many cases have escaped our notice because of the fact that we have not been careful to have a pathological report on every case of uterine hemorrhage.

That chorioepithelioma may exist primarily and independently of pregnancy is proved by the reports of Sheftel, Jeanneret, Tanget, Utz and others. The diagnosis of this condition is not always easy, inasmuch as positive microscopic findings are not always obtained, and one has to rely on the clinical symptoms entirely. Zondek points out that "in patients with cystic mole, or with chorioepithelioma, the urine contains much larger quantities of the hormone of the anterior lobe of the hypophysis than during pregnancy. Examination of the wall of the cystic mole has revealed that its hormonal content is considerably greater, namely, about five times as great as that of the normal placenta. In a chorioepithelioma the hormone exists likewise in large quantities.

"These observations suggest a new diagnostic method, namely, the examination of excised tissues, or those which have been removed by curettage, by means of the implantation method. However, on account of the toxicity of the tissues, especially in case of chorioepithelioma, the animals often die. Before implantation the tissues should therefore be detoxicated by placing them twenty-four hours in ether and then drying them by exposure to the air. The ether extracts the poisonous substances, but not the hormone, and the animals do not die. In this manner it is possible to test even malignant tumors. By means of sarcomatous tissues from the testes of two patients, the typical hypophyseal hormone reaction could be produced in the animal experiment. This indicates that a correlation exists between malignant tumors of the male genitalia and the anterior lobe of the hypophysis. In cases in which chorioepithelioma is suspected, tissues excised from the vagina or from the portio vaginalis are implanted into a test animal after previous detoxication. Whenever this implantation results in the hypophyseal hormone reaction, the diagnosis chorioepithelioma is correct because normal tissues do not give a reaction."

Dr. Beasley holds out a ray of hope which in past years has not been considered possible, that removal of the primary lesions will cure the metastatic lesions.

So far as my own personal experience is concerned, I can recall only one case which could possibly, without the aid of the microscope, be diagnosed as a chorioepithelioma.

Dr. Gilbert F. Douglas, Birmingham, Ala.—This condition might be classed as having parasitic tendencies, as it is of fetal origin, developing in the chorionic villi. As Dr. Beasley said, it is metastatic in nature and emboli passing through blood vessels land in distant parts, which lends greatly to the seriousness of the disease.

Records of obstetrical services of the Hillman Hospital, Birmingham, for the past eighteen months, where there were 2,000 deliveries, showed one case of hydatidiform mole and no chorioepithelioma reported by the pathologist. The Birmingham Baptist Hospital's records for the past five years showed 3,000 deliveries with five cases of hydatidiform mole and no chorioepithelioma.

I agree with Dr. Beasley that in all probability many cases are not recognized, but are classed as incomplete abortion, retained placenta, or submucous fibroid. With the rarity with which it is generally recognized and gravity of the disease, all questionable tissue should be examined microscopically by a pathologist, for if we hope to reduce the per cent of development of chorioepithelioma from the 7.5 to 50 per cent in cases of hydatidiform mole which develops within a few months, and save this number from an early death, we must be on the alert for these cases. This being a disease found in fertile women, the question of age, symptoms and pregnancy should be considered together.

Diagnosis is of the greatest importance. Hemorrhage, a more rapid development of the uterus than occurs in normal pregnancy, and the expulsion of a mole, are very suggestive symptoms. The Aschheim-Zondek test for pregnancy is of very great aid.

No negative scraping from the uterus should be accepted as conclusive. However, positive findings are conclusive.

Positive cases are of such grave prognosis that where the patient's condition is favorable radical treatment should be instituted early. Either surgery, radiation or both are used.

Dr. Emil Novak, Baltimore, Md.—As Dr. Beasley has said, more mistakes in diagnosis are made in this field than in almost any other in the domain of gynecological pathology. Because of this fact, the statistics on the subject, especially the older ones, are of very little value. A not uncommon error is to mistake a placental polyp for chorioepithelioma. Following a miscarriage or delivery bleeding will occur, and, perhaps many weeks later, the curette will bring away a large hemorrhagic mass of tissue, which may be diagnosed as chorioepithelioma because of certain misleading histological features.

Another common error is to interpret certain types of hydatidiform mole as chorioepithelioma. The most frequent form of vesicular mole presents no difficulty, being obviously benign. But when there is a great deal of trophoblastic overgrowth, the problem is not always

simple. Such overgrowth is especially conspicuous surrounding villi still *in situ* in the uterine wall, in cases where the uterus has been removed, and this histological picture has not infrequently led to the incorrect diagnosis of chorioepithelioma.

The normal fetal trophoblast has many characteristics resembling those of cancer tissue. It normally invades the uterine wall to a great extent, it normally invades the blood stream, and it even exhibits a physiological metastasis, through the deportation of villi to the lungs and other organs, very similar to the metastasis of cancer. Furthermore, it must be remembered that the trophoblastic elements of the malignant chorioepithelioma do not differ very markedly from those seen in normal pregnancy, so that the study of cell changes gives us much less help than it does in cancer diagnosis in other tissues. It is obvious, too, that the diagnosis of chorioepithelioma from curettings alone is a rather hazardous one, though it can sometimes be made.

Certainly it is incorrect to say that 50 per cent of hydatidiform moles become malignant. These moles are not infrequent, but chorioepithelioma is an extremely rare lesion. When it does occur, it follows hydatidiform mole in about 50 per cent of cases, but the reverse is not true, for the great majority of moles do not become malignant. I do not believe that the proportion is much over 1 per cent. Almost always, simple evacuation of the uterus will cure the benign mole.

As a rule, chorioepithelioma is very malignant, but in a small proportion of cases it may run a rather weird course and undergo spontaneous disappearance. In other cases, cure has resulted from very incomplete operation, perhaps even with metastasis to the vulva, vagina or other organs. It is difficult to explain these exceptional cases, though some believe that such spontaneous cures are due to the fact that the plugging of the blood vessels by the growth produces its strangulation.

THE TREATMENT OF CARDIAC DYSPNEA*

By T. R. HARRISON, M.D.,
Nashville, Tenn.

INTRODUCTION

Shortness of breath is the most important single symptom of heart disease. It is usually the first thing which attracts the patient's attention to his disorder and causes him to seek medical aid. Most physicians are familiar in a general way with the various therapeutic measures which can be used to combat this symptom, but exact knowledge has been lacking as to when each should be employed, and what in a given set of circumstances may be expected of a given method of treatment. Such a state of confusion is, in the last analysis, to be referred to the fact that dyspnea is a subjective phenomenon which does not easily lend itself to expression in a quantitative form. Thus if, following a drug, the patient says that his shortness of breath, although still present, is somewhat better, the physician, unless he be inclined toward self-deception, has to ask himself, "Did this drug really produce improvement? When this man says he is better is the wish the father to the thought?"

The story is quite otherwise in regard to the other cardinal symptom of cardiac failure, edema. Here one does not have to rely upon the patient's feelings, but can easily determine, by measuring the fluid exchange or by weighing the patient daily, whether or not a therapeutic measure is of value in promoting diuresis. It has seemed to us at Nashville that if we were to make any progress toward obtaining knowledge rather than impressions concerning the treatment of cardiac dyspnea it was first necessary that we learn how to measure this symptom. The task was attempted by my colleagues and myself with, in our opinion at least, some degree of success. The results of these investigations have been published elsewhere[1] and need only be summarized briefly here.

It was shown that, when there was no obstruction to respiration, the degree of dyspnea was related to the nearness which the volume of breathing per unit of time approached the maximum possible volume. The actual volume of breathing can be easily measured and the vital capacity (that is, the greatest volume of air which can be drawn into the lungs following a maximal expiration) is a measurement of the maximum possible volume. The degree of dyspnea, being directly proportional to the ventilation and inversely proportional to the vital capacity, can be expressed by the formula: $\text{Dyspnea} = \frac{\text{Ventilation}}{\text{Vital capacity.}}$ This formula applies equally well to the resting and the active state, but since a good many patients do not have dyspnea except with exertion, our measurements have usually been made during and after carefully standardized mild exercise. In order to make allowances for differences in nutritional state, fat normal people being notoriously more short of breath on exertion than thin ones, it was necessary to introduce a correction factor for the body weight. The value arrived at when the ventilation is divided by the vital capacity and multiplied by this correction factor has been

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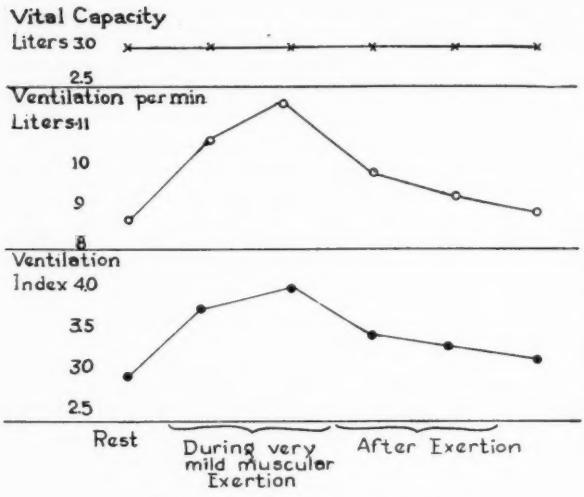

Fig. 1

designated as the "Ventilation Index," which has been found to constitute a satisfactory measure of the degree of respiratory distress.

In the past year we have studied the effect of a number of therapeutic measures on the ventilation index. Most of the studies are as yet incomplete, but enough has been learned to warrant publication of the present preliminary report of the findings.

RESULTS

(A) *The Effect of Rest.*—In *Fig. 1* is shown a comparison of the respiratory measurements on a patient while at rest and during and after the performance of very mild muscular work which consisted of opening and closing the hands. The vital capacity was not affected, but there was a marked increase in the ventilation per minute and in the ventilation index. This observation emphasizes the well known fact that the slightest muscular exertion predisposes to dyspnea in persons with cardiac disease.

(B) *The Effect of Digitalis.*—We were naturally especially interested in this drug, which is, with the exception of rest, the most potent single weapon available in combating cardiac failure. That it is of great value in persons with auricular fibrillation is admitted by all, and almost all cardiologists agree that it is extremely helpful in patients with regular rhythm who have advanced congestive failure with venous distention, edema and congested liver. There is no general agreement, however, as to whether digitalis is of value in patients with cardiac disease and with no symptom other than dyspnea. The effects of the drug in forty-two such cases were studied and have been published elsewhere.[2] The essential findings were as follows: Patients with paroxysmal attacks of nocturnal dyspnea were very much benefited, the drug abolishing the seizures in many cases. The effects in patients whose only symptom was dyspnea on the performance of muscular work was less dramatic, but in almost two-thirds of the cases subjective improvement was obtained. Respiratory measurements confirmed this, the ventilation index usually decreasing (denoting improvement) following the administration of

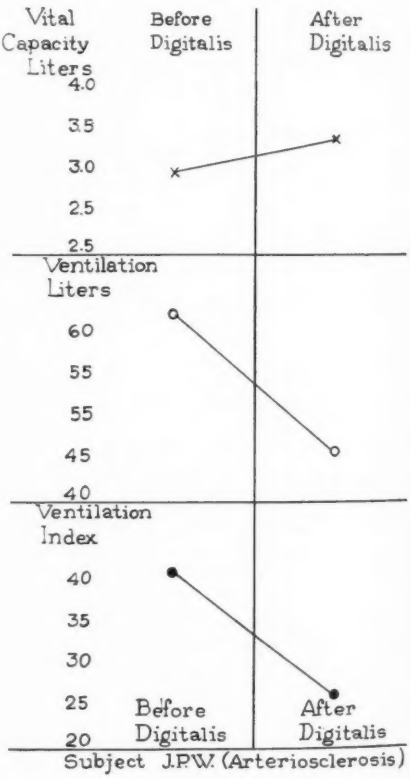

Fig. 2

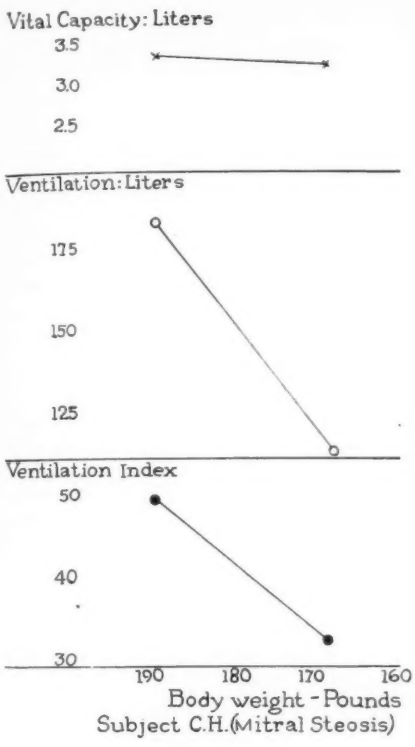

Fig. 3

the drug. An example of the results in such a case is shown in *Fig. 2*. This patient showed well marked objective as well as subjective improvement following digitalization.

(C) *The Effects of Reduction of Weight.*—Since obesity predisposes to shortness of breath in otherwise normal persons, it was to be expected that in obese patients with cardiac disease the respiratory discomfort would be partially dependent on the abnormal nutritional state. In such persons reduction of weight should be accompanied by improvement in the dyspnea. That this is actually the case is shown in *Fig. 3*.

To date such measurements have been made on only a few persons, but we have observed subjective improvement in a number of other patients. It is safe to conclude that when a person with cardiac disease is fat, as many are, reduction of the weight is indicated. This procedure has a further advantage in that the restriction of carbohydrate, which is necessary in such a diet, often affords considerable relief from the distention of "gas" from which many of these patients suffer.

(D) *The Effect of Venesection.*—Bleeding has been a time-honored remedy for dropsy. In recent years the procedure has been employed less frequently than formerly and most clinicians are not inclined toward venesection except in patients with very severe symptoms. Some time ago we were making repeated observations on the blood gases in persons with cardiac disease and had occasion to withdraw one or two ounces of blood from patients at frequent intervals. Later, when the practice was discontinued, one particularly observant patient continued to come back for further bleeding, saying that it always made him feel better. We were rather skeptical as to any therapeutic benefit to be gained by taking such small amounts of blood, but there can be no doubt that many

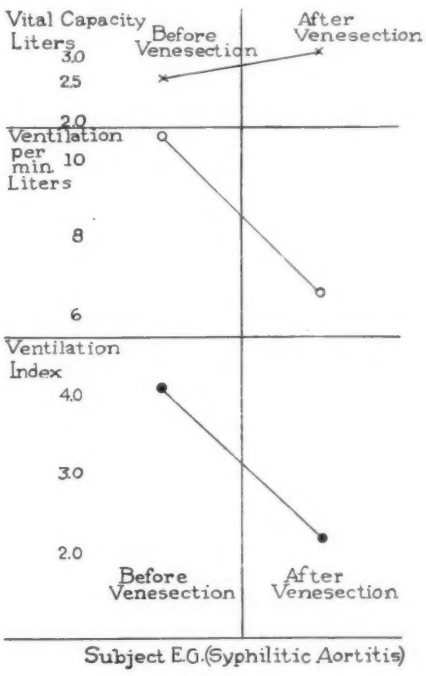

Fig. 4

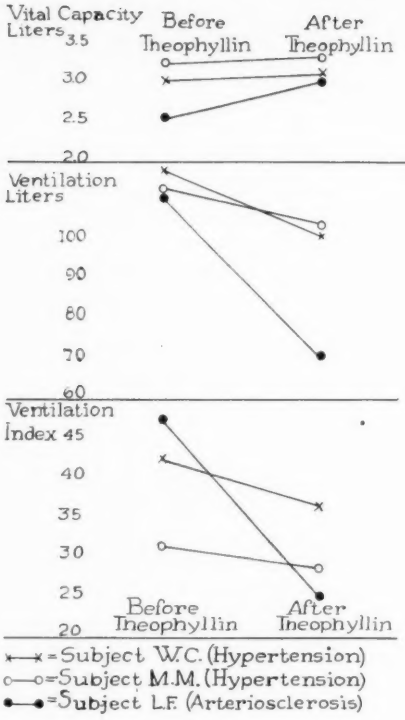

Fig. 5

patients are helped, for the time being, by removing several hundred cubic centimeters. An example is shown in *Fig. 4*.

(E) *The Effect of Theophyllin.*—The value of this drug as a diuretic is well known. For several years we have been prescribing it routinely to patients who were ambulatory and had a tendency to gain edema, the drug to be taken only on one or two days a week. On many occasions such patients, after becoming and remaining edema free, continued to ask for theophyllin, saying that even when they had no "swelling" and when there was "no action on the kidneys" their "breath" was better when they took it. At first we were rather skeptical, believing that the drug was only of value as a diuretic, but the experience was repeated so often that we began to believe in the value of theophyllin in combating cardiac dyspnea. Respiratory measurements have now been made on a number of patients before and after theophyllin was administered. Examples of such observations are shown in *Fig. 5*, and it can be seen that each patient showed objective improvement of dyspnea after receiving this drug. The vital capacity was increased to significant degree in only one of the three patients, but the ventilation and ventilation index were decreased in all of them. We are continuing our studies with theophyllin and hope in the near future to gain a better insight into the exact means by which this drug often proves beneficial to dyspneic patients.

DISCUSSION

The therapeutic measures which have been mentioned are by no means the only ones available in the treatment of cardiac dyspnea. Other drugs, such as opiates and metaphyllin, are sometimes of great value. Likewise, such procedures as the inhalation of oxygen and binding the extremities in acute paroxysms of dyspnea are occasionally helpful. We have not yet had opportunity to study all of these measures in a quantitative way, but we hope to do so in the near future. As a result of the quantitative measurements which have been made plus clinical experience with other therapeutic measures, the following general plan of management has been adopted in the cardiac clinic at Vanderbilt University.

Patients with cardiac disease are classified into three general groups according to the severity of their dyspnea.

(1) Asymptomatic patients, that is, persons who have definite signs (such as enlargement of the heart or diastolic murmurs) of organic heart disease, but who have no dyspnea when performing their normal activities, are never given drugs. They are warned against overdoing and are told that they may do anything which does not make them short of breath, but must never attempt exertion severe enough to cause dyspnea. If they are obese, as many are, they are given a diet to reduce the weight. The diet should not be too drastic. The general object should be to have the patient lose about five pounds per month until he becomes somewhat under the so-called "ideal" weight for his height, sex and age.

Most important of all, the patient is warned against infections. He is cautioned against exposure to rain or snow, against sleeping in draughts, and particularly against contacts with persons who have colds, coughs, influenza and other respiratory infections.

(2) *The Stage of Limited Cardiac Reserve.*—By this term are designated those patients who have dyspnea on effort, but none at rest. The general instructions which have been listed above are given these persons also. If the patient finds that dyspnea results from the minimal bodily effort which is compatible with his leading an economically useful life an effort is made through the social service to procure a "lighter" job. If dyspnea persists digitalis is indicated. Such persons should be well digitalized, although since they are not hospitalized, the drug is given somewhat more slowly than is our custom in patients which are under constant observation in the hospital. Ordinarily 1.5 to 2 grams of the powdered leaf in three or four days is a satisfactory dose. Following this a daily dose of 0.1 to 0.2 grams should be given. Once digitalized, the patient should continue to take the drug for the rest of his life.

If digitalis fails to relieve the patient's symptoms, the activities are restricted to a greater degree and theophyllin is administered. Different subjects vary greatly in the amount of theophyllin tolerated. Some persons become nauseated when receiving as little as 0.3 grams daily, but this is unusual. Most of our patients are instructed to take one capsule (0.3 grams) after supper and, if necessary, an additional dose after breakfast. This drug seems to be particularly beneficial to those patients who have dyspnea which keeps them awake at night, but it is also helpful in the dyspnea of effort. If the patient becomes nauseated it is often difficult to decide whether this symptom is due to the digitalis or the theophyllin. In case of doubt it may be necessary to stop both drugs for a few days.

Unlike digitalis, theophyllin should not be administered indefinitely, but should be discontinued as soon as the patient's condition warrants it, to be readministered if dyspnea again becomes severe.

By this general plan we have been able to keep many patients who otherwise would probably have been bed-ridden ambulatory for months or years, and some of them have continued to do light work. Eventually, however, the condition becomes worse and the second passes into the third stage.

(3) Congestive heart failure is a relative term, but we usually use it only to designate those cases who have symptoms (dyspnea or edema) at rest. Such symptoms may be intermittent or continuous. Paroxysmal dyspnea usually responds to morphine, although in some cases venesection, inhalation of oxygen and binding the extremities are also necessary. The attacks can be prevented in most cases by the administration of digitalis and of theophyllin as already described. In patients who have edema, diuretic measures, if successful in increasing the urine volume, usually produce marked improvement in dyspnea. The Karrell diet (a glass of milk four times daily with no other food or fluid) and salyrgan (one to two cubic centimeters intravenously once or twice weekly) are often especially helpful in this regard. Venesection may also prove useful. Morphine may be used occasionally, but should be replaced by codein whenever possible.

SUMMARY

A method of expressing cardiac dyspnea in quantitative terms has been developed. By means of it a demonstration has been made of the value of such well accepted therapeutic measures as rest and venesection. It has been shown that digitalis is beneficial in relatively early as well as in advanced cases of cardiac disease. In obese patients reduction of the body weight is followed by improvement in dyspnea. An objective demonstration has been made of the value of theophyllin, not only as a diuretic, but in combating dyspnea in persons who have no edema. On the basis of these findings a general plan of management for patients with cardiac dyspnea has been outlined.

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X-RAY EXAMINATION OF THE HEART IN LEFT AURICULAR ENLARGEMENT*

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Examination of the heart by means of roentgenoscopic and roentgenographic methods has been practised since the early days of roentgenology. In recent years interest has been renewed in the use of these methods and they have been elaborated, but at the present time few internists and radiologists properly evaluate this means of examination, and particularly is this true of studies of the left auricle. It should be clearly recognized that such examinations are not intended to take the place of a physical examination and a careful history, but are to supplement them in properly selected cases. The examination may consist of a teleroentgenogram and a careful roentgenoscopic examination or of an orthodiagram and a roentgenoscopic examination. In no case should the roentgenoscopic examination be omitted, for valuable information can be obtained by observation of the heart in the oblique views, of the pulsations of the enlarged chambers, and of the barium filled esophagus. While orthodiagraphic tracings are easily and quickly made with the aid of the fluoroscopic accessories supplied by most manufacturers of x-ray equipment, such appliances are not essential and most roentgenoscopic units can be adapted to orthodiagraphy.

Before undertaking an x-ray study of enlargement of the left auricle it is essential that one be familiar with the structures which make up the normal heart shadow as seen in the posterior-anterior and the right and left oblique views. *Figs. 1, 2,* and *3* show these structures in normal subjects. These drawings are modeled

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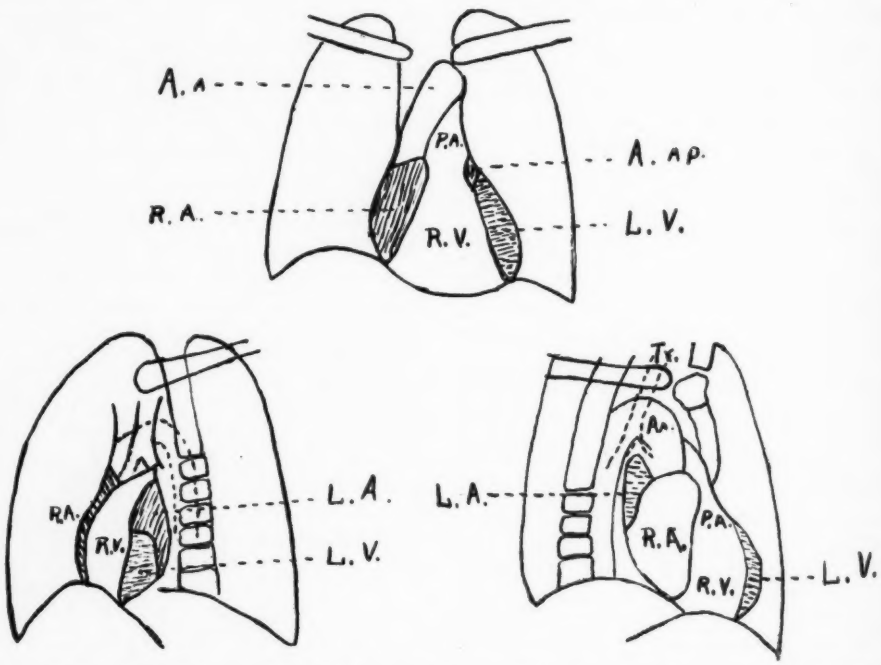

Fig. 1 (Top). Diagram of the normal heart in the posterior-anterior position. A a, Ascending aorta. P a, Pulmonary artery. A ap, Left auricular appendage. R v, Right ventricle. R a, Right antrum. L v, Left ventricle.

Fig. 2 (Bottom—Left). Diagram for the normal heart in the left anterior-oblique position. R a, Right auricle. R v, Right ventricle. L a, Left auricle. L v, Left ventricle.

Fig. 3 (Bottom—Right). Diagram of the normal heart in an exaggerated right anterior-oblique position. R a, Right auricle. R v, Right ventricle. A a, Ascending aorta. P a, Pulmonary artery. L a, Left auricle. L v, Left ventricle. Tr, Trachea.

after those of Vaquez and Bordet,[1] Groedel,[2] and David Steel.[3]

The relation of the left auricle to the other chambers of the heart and to the bronchi and esophagus was studied by means of x-ray examination and anatomical dissection by Joffe[4] and Groedel[2] and by observation on the cadaver by Stoerk.[5] More recently J. M. Steele[6] and Paterson[7] and David Steel[3] have studied the effect which enlargement of the left auricle exerts on the shape and position of the heart and upon the bronchi and Rigler[8 9] has studied the effect on the esophagus as demonstrated by visualization with a barium suspension.

A complete review of the anatomical relations cannot be given in the limited time at our disposal, but a few salient points should be remembered. The left auricle is situated higher than any of the other chambers of the heart and is normally placed posteriorly. It lies just below the bifurcation of the trachea and as a rule the left main bronchus rests upon it. The esophagus is placed just behind it and is in contact with the pericardium overlying the left auricle for a distance of several centimeters.

As a result of the posterior position of the left auricle enlargement can take place to the right or to the left, but enlargement to the right is of much more frequent occurrence. Steele and Paterson[7] have given a concise review of the literature dealing with right sided enlargement. In moderate enlargement to the right clinical symptoms are seldom noted, but radiographic examination in the posterior-anterior position often shows the enlarged right border of the left auricle as a dense shadow behind and just medial to the edge of the right auricle. Cases of enormous enlargement of the left auricle have been reported where the left auricle extended far beyond the border of the right auricle and was mistaken for pleural effusion or aneurysm. David Steel,[3] reporting on a group of 100 cases which were studied clinically, roentgenologically and pathologically, did not find any case in which the enlarged left auricle formed a part of the left heart outline; although some believe that it may help to form the left border. He has pointed out that the rotation of the heart which takes place in mitral disease causes a displacement of the left auricle posteriorly and that the portion of the left auricle which was posterior is rotated to the right. The pulmonary artery is rotated to the left and becomes more prominent, producing the straight line left border or the arched left border found in mitral disease. These changes in the contour of the heart found in mitral disease by reason of the rotation of the heart are produced by the enlargement of the right ventricle which is normally placed anteriorly and is in contact with the diaphragm and the anterior chest wall.

The fact that enlargement of the left auricle caused displacement of the esophagus was emphasized as early as 1910 by Kovacz and Stoerk.[10] In recent years Rigler[8 9] has studied the effect of left auricular enlargement on the position and contour of the esophagus. If the patient is required to swallow a suspension of barium the esophagus is found displaced backward and to the right and the amount of displacement is in proportion to the degree of enlargement of the left auricle. These observations are best made in the posterior-anterior and the right anterior oblique positions. Many cases in which there is slight deviation of the esophagus have no clinical symptoms. In other cases there is a definite difficulty in swallowing and the cases that are so affected with dysphagia are the ones showing the most marked displacement and compression of the esophagus. Rigler[8 9] has pointed out the value of observations on the barium filled esophagus in differentiating mitral disease from the right-sided cardiac hypertrophy seen in congenital hearts and in cases of obstruction or increased pressure in the lesser circulation such as is produced by pulmonary emphysema, pulmonary fibrosis or sclerosis of the pulmonary circulation.

That left auricular enlargement would cause compression of the left main bronchus was recognized many years before the discovery of roentgen rays and J. M. Steele[6] has given a very interesting review of the literature. In 1910, Stoerk[5] published the results of his anatomical studies on displacement of the left main bronchus in mitral disease. His figures for the normal subject were an average total angle between the right and left bronchi of 69° with extremes of 58° and 78°. The average total angle in cases of mitral disease was 95° with extremes of 78° and 117°.

J. M. Steele and Paterson,[7] in a series of cases in which x-ray studies were made, found that the limit of variation of the angle between the right and left bronchi in the normal subject as measured in posterior-anterior films made at 6 feet after lipiodol injection was 38° to 70° with an average of 58°. They point out that the slight difference of these figures from those of Stoerk is probably apparent and not real, since the angle shown on the film is apt to be

less than the actual angle. In the left anterior oblique position the angle between the two main bronchi is 5° to 10° less than in the corresponding posterior-anterior position and normally there is a definite space between the posterior edge of the auricular shadow and the left main bronchus. In left auricular enlargement this space is obliterated.

The bronchi can be visualized in the left anterior oblique position in most cases and in thin subjects in the posterior-anterior position. In heavy subjects it is necessary to inject lipiodol into the bronchial tree so that sufficiently clear visualization may be obtained to determine the angle between the two main bronchi. Cases showing an increased angle between the two main bronchi without compression of the left main bronchus do not usually show symptoms. Case number 4 is interesting because there were definite symptoms which could be attributed to the pressure of the enlarged left auricle on the left main bronchus which was sufficient to produce an increased angulation and compression.

Case 1.—F. P., a white woman, age 28, first consulted Dr. Homan on July 8, 1930. Her family history was non-contributory. Past history was negative, there being no history of rheumatism. For the preceding year the patient had lost weight; there was considerable weakness and during the previous six weeks she had been running an afternoon temperature of 99.6°. During these six weeks there had been some coughing, productive on several occasions, with a rusty sputum.

The only physical findings of interest was a presystolic murmur over the apex which was heard only after exercise. The orthodiagram (*Fig. 4*) showed a long narrow heart with a slightly arched left border typical of a mitral lesion. The measurements were M. R. 2.5 cm., M. L. 6 cm., L. 11 cm., diameter of aorta 4 cm. The oblique views showed definite enlargement of the left auricle with moderate pulsation.

Case 2.—K. F., a white woman, age 34 years, first consulted Dr. Homan April 26, 1930. Her family history was non-contributory. The patient had always been well except for rather frequent sore throats until the age of 16 years, at which time she was in bed for three weeks with red and painfully swollen joints. Since that time she had always been weak and easily fatigued, but until one year before had had no definite complaints. At this time, following the accidental death of her father, she began to sleep poorly and complained of palpitation which was not related to exercise. About ten months previously, following a severe cold, she spat up blood-streaked sputum on several occasions and at that time was told that she had a heart lesion. Since then she has been extremely nervous, she had a very poor appetite, choking sensations, gas after meals, pain in the left lower chest and inner side of left arms which was constant and not related to exercise, and at times the weight of her clothes was very annoying.

The physical findings which are of interest are as follows: pulse is 80 in reclining posture and 116 in sitting posture; blood pressure, 116 systolic and 58 diastolic; no cyanosis; soft to and fro murmur at aortic area; P_2 is exaggerated; there is a rough presystolic murmur at the apex which is transmitted to the axilla; no rales at bases; no edema. The liver is not enlarged.

The orthodiagram (*Fig. 5*) shows the left arched border characteristic of a mitral lesion. The measurements were M. R. 4 cm., M. L. 6 cm., L. 13½ cm.; diameter of aorta, 4 cm. The oblique views showed moderate enlargement of the left auricle with abnormal pulsation.

Case 3.—W. B., a white man, age 20 years, was referred for radiographic examination by Dr. E. A. Gilbert April 4, 1928. His family history was non-contributory. The patient never had an attack of rheu-

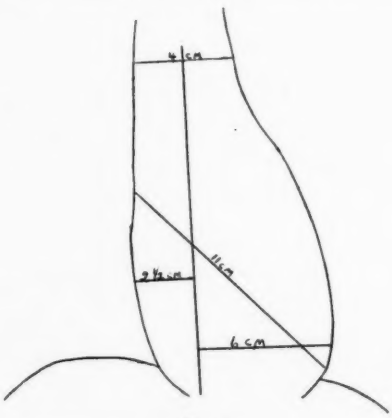

Fig. 4
Orthodiagram, F. P., Case 1. Mitral lesion. Comparatively early heart changes.

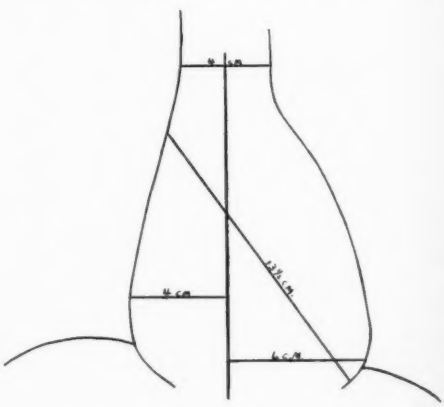

Fig. 5
Orthodiagram, K. F., Case 2. Mitral lesion. Moderate enlargement of heart.

matic fever or other acute infection, but did have frequent sore throats and the tonsils were removed at 11 years of age. The heart lesion was first discovered during a careful examination following a stab wound of the chest at 18 years of age.

Physical examination revealed a marked enlargement of the heart with a loud rough presystolic murmur and a rather loud systolic murmur at the apex. A loud to and fro murmur was heard over the base of the heart.

The teleroentgenogram (*Fig. 6*) showed an enlarged heart with a markedly arched left border and a rounded right border. The measurements were M. R. 6.7 cm., M. L. 11.5 cm., L. 19 cm., diameter of aorta 5.2 cm. The right border of the left auricle could be distinctly seen behind the right auricular shadow in the film.

The blood Wassermann was negative.

The case terminated fatally in August, 1931.

This case is presented to illustrate marked enlargement of the left auricle.

Case 4.—T. S., a white man, age 46 years, was referred for radiographic examination November 5, 1930. His family history was non-contributory. The patient had an attack of rheumatic fever at the age of 5 and again at 8 years. The tonsils were not removed until 1918, at the age of 34. There were no symptoms referable to the heart until 1918, during service in the Army. After walking up a steep grade from quarters to the hospital he noticed some shortness of breath, which soon became so marked that he was kept in bed for a few days. During the following eight years shortness of breath and angina-like pains in the precordial region were noticed only after extreme exertion. In 1926 he began to have attacks of acute colds with

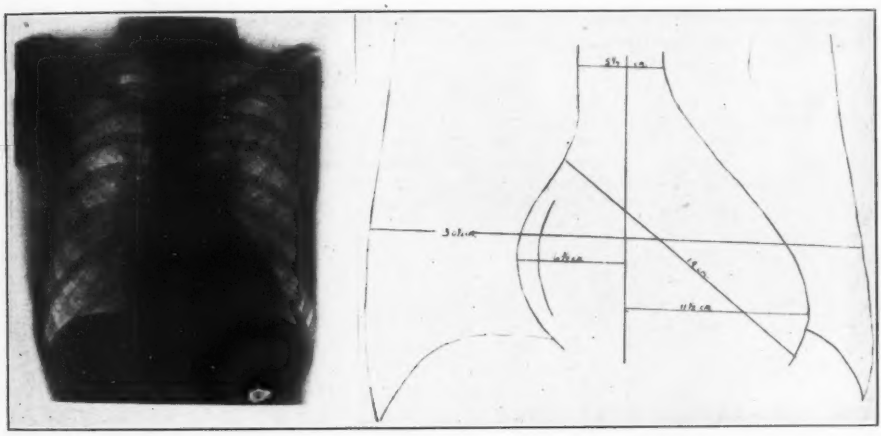

Fig. 6-A Fig. 6-B

W. B., Case 3. 6-A, Multiple valvular lesion with marked enlargement of heart. 6-B shows the location of the right border of the left auricle behind the right auricular shadow. This could be seen in the film, but is not shown in the reproduction.

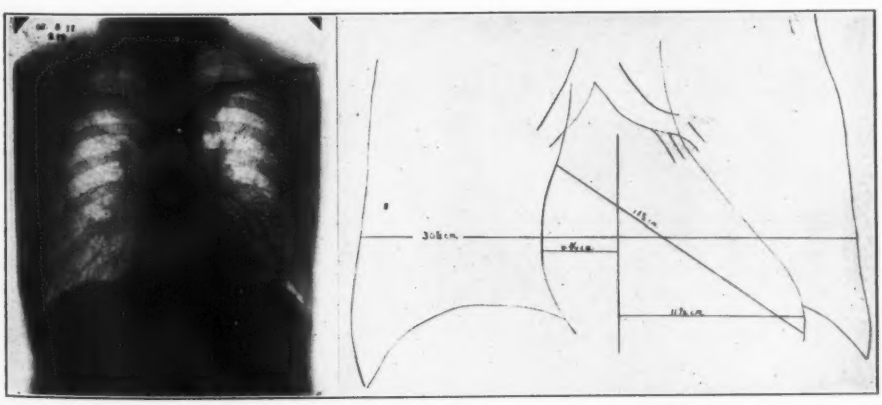

Fig. 7-A Fig. 7-B

T. S., Case 4. Mitral lesion. Enlarged left auricle has caused elevation and compression of the left main bronchus.

signs of congestion at the left base, which always remained one or two weeks after the temperature had returned to normal. In 1927 there was a pneumonia at the left base. These attacks became more frequent and a longer time was required for clearing of the left base. In the previous few weeks he has had frequent attacks of asthmatic breathing which were limited to the left base and which were of short duration.

The physical findings of interest were that during these attacks of acute infection the pulse rate was between 100 and 120, depending on the degree of fever. Between attacks of infection the pulse was normal. On several occasions during attacks of cyanosis there was a loud, rough presystolic murmur and a rather soft systolic murmur at the apex with an exaggerated P_2. Between attacks no murmur could be elicited except following exercise or when in the reclining position. During the past two months there has been an almost continuous cough which has been very annoying.

The teleroentgenogram showed an enlargement of the heart to the left with a straight left border. The measurements were M. R. 4.7 cm., M. L. 11.5 cm., L. 18.5 cm. The oblique views showed definite enlargement of the left auricle with abnormal pulsations. Because the history was suggestive of compression of the left bronchus lipiodol was introduced into the left bronchus. *Fig.* 7 shows e'evation and slight compression of the left bronchus. Following the introduction of lipiodol very definite improvement in the patient's condition occurred. The cough disappeared, the physical signs at the left base cleared up and the attacks of acute colds and symptoms at the left base became much less frequent. This improvement has continued until the present, October, 1931.

Case 5.—G. W., a white man, age 33 years, was first seen by Dr. Homan August 4, 1931. His complaint was an irregular heart. The family history was noncontributory. The past history was negative with no rheumatism, no chorea and no growing pains. Tonsillectomy was done at 13 years of age. The present illness dates from April 6, 1930. On April 5 he played 18 holes of golf with no discomfort. On the evening of April 6 he played cards, had two highballs and ate a cold lunch. Immediately after eating he felt a fullness under his sternum. He went to bed and slept well until 3:30 a. m., when he woke up with a marked orthopnea. At this time he had a rapid pulse, was quite blue and for one week he was critically ill. After this week he improved, but continued in bed for a period of two months and did not return to work until September, 1930. Since that time he has been taking ten minims of digitalis each day. He has continued to have a moderate amount of dyspnea and an irregular heart beat, although he has taken very little exercise since he returned to work.

Physical examination shows the patient comfortable at rest, with no orthopnea, and no cyanosis. His pulse

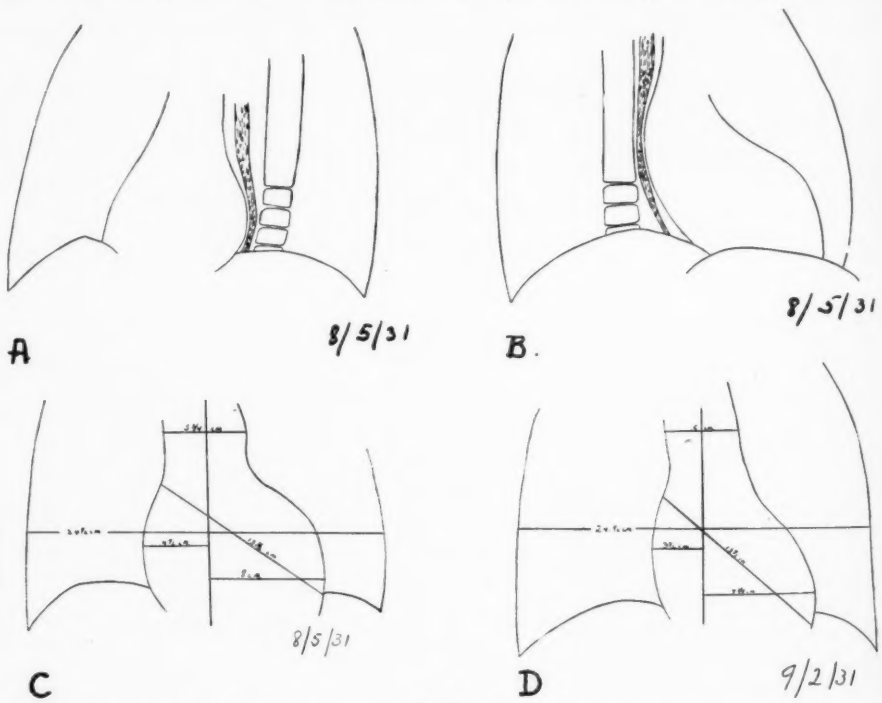

Fig. 8

Orthodiagram, G. W., Case 5. Auricular fibrillation without demonstrable valvular lesion. A, B and C made while heart was fibrillating. D made after quinidine sulphate had been administered and fibrillation had stopped.

at the apex is 118 and at the wrist 92. After exercise the pulse at the apex was so fast it could not be counted and at the wrist it was 140, at the end of 2 minutes it was 112, and at the end of three minutes it was 96. The patient was markedly dyspneic and cyanotic. The blood pressure in the reclining position was systolic 100 and diastolic 60; in the upright position systolic pressure was 98 and diastolic was 74. No murmurs or thrills could be distinguished. The electrocardiogram showed auricular fibrillation. The orthodiagram showed a very markedly arched left border with a prominence of the lower part of the right border, *Fig. 8C*. The measurements in the P. A. tracing were M. R. 4.5 cm., M. L. 8 cm., L. 13.5 cm., diameter of aorta 5.7 cm. Oblique views, both right and left, showed marked enlargement of the left auricle with very definite abnormal pulsation. Observations made in the oblique views on the barium filled esophagus (*Figs. 8A* and *B*) showed a definite displacement of the esophagus and slight compression.

The patient was digitalized and on August 22 the pulse rate was 65 with no pulse deficit. The pulse rose to 104 after exercise and at the end of three minutes was 68. There was no dyspnea or cyanosis. An electrocardiogram made at this time still showed auricular fibrillation.

On August 29, the patient was put to bed and given quinidine sulphate grains three at 1:00 and 4:00 p. m. There were no toxic symptoms. August 30, he received five 6-grain doses of quinidine sulphate with a slight rise in pulse pressure, but no other toxic symptoms. On September 1, the patient was given 6-grain doses of quinidine sulphate for four doses, the last being at 3:00 o'clock. The pulse was still irregular at 3:30 and he complained of slight headache. He went to sleep and when he awoke at about 4:30 his pulse rate was 76 and regular. The pulse continued normal and on September 2 the electrocardiogram was negative. The physical findings were now all normal. The orthodiagram at this time was strikingly different. As is shown in *Fig. 8D*, the shape of the heart is entirely altered. The left border no longer shows the arched contour and the right border is not arched and projecting as in the previous tracing. The outline is now that of a normal heart. The measurements were M. R. 3.5 cm., M. L. 5.7 cm., L. 13.5 cm., and diameter of aorta 5 cm. In the oblique views no enlargement of the left auricle could be demonstrated and no abnormal pulsations were seen.

SUMMARY

X-ray examination of the heart in left auricular enlargement gives information that is of value in diagnosis and prognosis.

The methods of examination are outlined and the findings in the normal subjects are very briefly reviewed. The changes produced by left auricular enlargement are on the contour of the heart, on the bronchi, and on the esophagus.

Five cases are reported with orthodiagrams or teleroentgenograms.*

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DISCUSSION (*Abstract*)

Dr. C. H. Heacock. Memphis. Tenn.—The demonstration of left auricular hypertrophy with the aid of visualization of the left bronchus with lipiodol, as well as the visualization of the esophagus with barium, is spectacular and convincing. We should remember, however, that Dr. Bogart stated it is to be used only in selected cases.

On studying the heart by the teleroentgenogram or orthodiagram, and fluoroscopically, we are able to detect practically all these enlargements. The oblique views should never be omitted, as in some slowly developing cases of mitral stenosis a moderate enlargement cannot be detected in the anteroposterior view.

Kohler gives an additional roentgenographic finding in mitral stenosis. While the patient is in the erect position, the upper limiting point of the left ventricle on the left border of the heart is compared with the upper terminal point of the arch of the right auricle on the right side. Normally, this point on the left side is only slightly lower, whereas in mitral stenosis it is considerably lower.

I should like to know whether Dr. Bogart or Dr. Homan has an explanation for the enlargement of the left auricle alone in the case with auricular fibrillation. In describing the roentgenoscopic findings in this case, Dr. Bogart stated that the pulsations were "definitely abnormal." I should like to ask him to describe these pulsations in detail. In this condition, visible pulsations are frequently lacking. A "rocking" motion of the auricles may be present.

I believe the idea of injecting the left bronchus of the patient with left lower lobe symptoms was very

*The clinical data for these case reports was supplied by Dr. C. E. Homan, Jr., and Dr. E. A. Gilbert.

ingenious. It is interesting to speculate whether the lipiodol had any therapeutic effect, or whether the prompt improvement was merely coincidental.

Dr. Harry Hillstrom, Nashville, Tenn.—We are indebted to Dr. Bogart for calling our attention to the pathological changes in the left atrium or auricle, as well as to the methods for determining these changes. In the South we have even more left ventricular lesions than we have in the North, on account of the greater incidence of luetic cardiovascular disease. Again, we seem to have less mitral disease, possibly on account of the climate. On account of this relative infrequency of mitral lesions, we should be all the more careful in our cardiac examinations so that early mitral lesions will not be overlooked, and to that end we should be familiar with all the diagnostic aids.

I do not think Dr. Bogart emphasized the methods of diagnosis quite enough. The barium suspension method for the visualization of the cardio-esophageal relationship is very simple. On account of the close relationship of esophagus to left auricle, early changes in this chamber will produce a displacement of the esophagus, as Dr. Bogart pointed out. By giving the patient this thick barium sulphate paste, the path of the esophagus can be clearly visualized and changes noted. Because of the closer relationship of the left auricle to the esophagus than to the stem bronchi, because of the easier visualization of the barium filled esophagus than the bronchi, because of the simplicity of having the patient swallow barium instead of injecting lipiodol into his bronchi, I feel that the method of examination of the left auricle by means of visualized esophagus is more satisfactory.

I also agree that cases should be selected. These methods are most useful in early mitral lesions and in differentiating mitral from congenital cardiac lesions. In the former, the left auricle is dilated, in the latter it is not.

Either method is of great value, is simple enough for routine use, and should be taken advantage of.

Dr. Bogart (closing).—Answering the question of Dr. Heacock, neither Dr. Homan nor I could be positive that *Case 5* did not have a mitral lesion, although we were never able to demonstrate it. If he did have a mitral lesion, I do not know why the auricle returned to normal size so promptly, and I believe that this fact probably indicates that he did not have the mitral lesion. It may be that I erred in calling the abnormal movements of the auricles abnormal pulsations. This case was fibrillating at the time of the first orthodiagram and the patient did have very abnormal auricular movement.

It is interesting, in *Case 4*, to speculate on whether or not the lipiodol had any actual therapeutic value. If it did, the beneficial effect was on the secondary infection which accompanied the compression of the left bronchus and the bronchiectasis at the left base. This idea is of course not at all new. I have seen other cases of bronchiectasis improve after lipiodol, and I personally believe there is some therapeutic value.

THE OFFENSIVE AND DEFENSIVE REACTIONS IN ACUTE INFECTIONS OF A MUCOUS MEMBRANE*

By HARVEY J. HOWARD, M.D.,
St. Louis, Mo.

There are few problems in the study of infectious diseases that offer greater interest than the reactions of the tissues in response to an infectious process. While opinion has varied from the importance of tissue changes to that of functional changes accompanying infection, experimental and clinical observations are pointing to the activity of both changes occurring in unison in overcoming infections. Until recently, most of the studies have been anthropocentric and have been concerned chiefly with the reactions of the body against the invading parasites. However, when one considers communicable diseases, it becomes obvious that the parasite in its struggle for existence must set up a strong offensive which eventually determines both the degree and variety of the defensive reaction established by the host. It is necessary, therefore, in order to obtain a clear understanding of an infectious process, to study (1) the characteristics and specific behaviors of the invading parasites, and (2) the tissues themselves throughout the successive stages of an infection; that is, from the beginning of the bacterial invasion to the ultimate reaction of tissue repair.

For the purposes of this discussion the principal consideration will be that of acute infections of the mucous membranes of the eye. The conclusions and interpretations of the discussion, however, need not be limited to this organ, since the mucosa of the eye may be thought of as a paradigm for other similar tissues. By way of introduction it would be well to state that a complete understanding of the mechanism involved in an infection of any mucous membrane is not possible at the present time, since the limitations of the methods and tools employed still leave the biological data inadequate. Moreover, the tissue changes of the eye vary in such a kaleidoscopic manner and so rapidly that it is frequently difficult to interpret the observations of a single specimen without a thorough knowledge of the preceding changes. However, the latter objection may be controlled to

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some extent by the study of frequent observations on successive specimens.

All mucous membranes are ectodermal in origin, as is also the skin. But a mucous membrane differs from the skin in that it is composed wholly of living epithelial cells, whereas the superficial layers of epithelial cells of the skin are dead. These dead cells serve as a mechanical protection to the skin in preventing infection by certain parasitic microorganisms. Without this protection a mucous membrane is susceptible to infection by these bacteria. All mucous membranes, however, are probably not susceptible to the very same parasites and to the same extent, but in a general way the tissue reactions are undoubtedly quite similar. The discussion of this paper, then, is confined to the mucous membrane of the eye; that is, the conjunctiva and the epithelial covering of the cornea.

The normal conjunctiva is composed of from three to ten layers of living epithelial cells,[1a] which vary greatly in thickness and in lateral dimensions. The more superficial the cells, the flatter and broader they are; also, the less vital as compared with the younger cells of the deeper layers. The subconjunctival tissue has a blood and lymph supply which is responsible for the steady development of new epithelial cells in the overlying conjunctiva. The subconjunctival blood and lymph supply is quickly and tremendously increased by local irritation. At such times the growth of new epithelial cells in the conjunctiva is greatly accelerated.

The external membrane of the normal cornea is composed of from five to seven layers of living epithelial cells,[1b] all of which are much flatter and less vital than the cells of the conjunctiva. These corneal cells have no substratum of blood and lymph vessels as the conjunctiva has to accelerate the generation of new cells. As a matter of fact, they lie directly upon a homogeneous membrane (Bowman's) which to all intents and purposes is only slightly permeable, if at all, to fluids. Therefore, whatever emergency nutrition the epithelial cells of the cornea require over and above that possibly provided by the lymph supply of the substantia propria of the cornea must come from the subconjunctival vessels at the periphery of the cornea. These structural differences in the cells of the conjunctiva and cornea may account for their different reactions to parasitic microorganisms.

In acute conjunctival infections there are two major processes going on more or less simultaneously: one, the action of offense by the invading bacteria; the other, the reaction of defense of the tissue attacked.

(1) THE OFFENSIVE ACTION OF THE BACTERIA

While it is not entirely clear how infection progresses chronologically, nevertheless it has been possible to reconstruct some of the progressive stages of bacterial invasion by a careful study of specimens taken from the eye at different intervals. It is not intended to imply, however, that the reconstruction to be developed in this discussion is a completely accurate account of infection, but rather that it is an attempt to visualize the successive steps in the offensive action of bacteria as determined by special methods.

(A) *Fixation of Bacteria on the Conjunctiva.* When a parasitic microorganism like the gonococcus is carried into the conjunctival sac of a human individual, it quickly attaches itself somewhere on the surface of the normal conjunctiva. The parasite finds an adequate food supply on its host and in a few hours it forms, by multiplication, a small turf-like growth of organisms around the original gonococcus. The bacteria proliferate in a single layer, so that each organism is attached to the surface of a living epithelial cell (*Fig. 1*). Furthermore, each organism becomes the focus of a new proliferation, which means that extension takes place by geometric progression.

(B) *Extension of the Infection.*—The beginning of inflammatory symptoms is dependent upon the rate and extension of the prolifera-

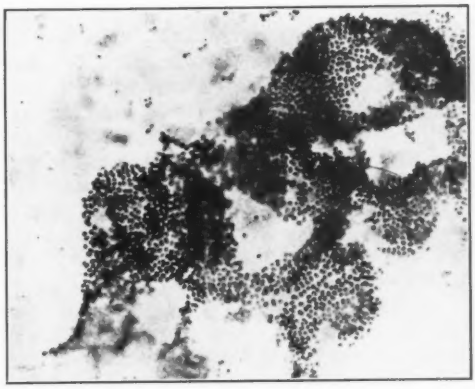

Fig. 1
Gonococci growing turf-like on the anterior surface of epithelial cells of the conjunctiva. X 1000.

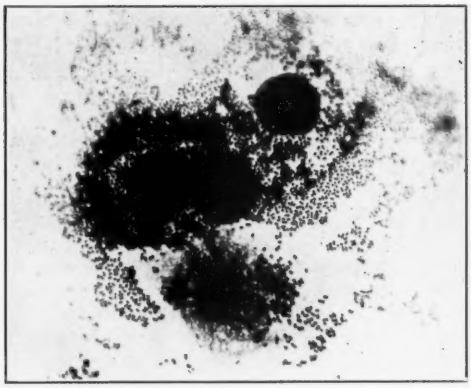

Fig. 2
Pneumococci growing turf-like on the epithelial cells. Giemsa stain. X 1000.

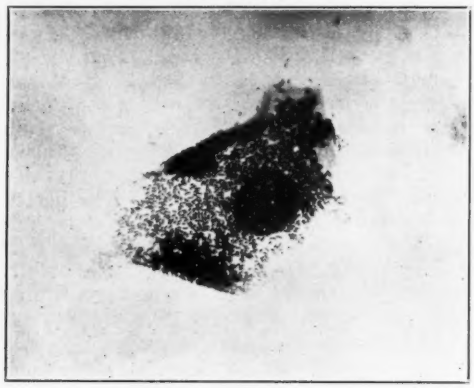

Fig. 3
Koch-Weeks bacilli growing turf-like on epithelial cells. Giemsa stain. X 1000.

tion of the bacteria on the surface of the conjunctiva. The infection spreads as bacteria are loosened from the host cells by movement and pressure of the eyelids, or even by the increased lacrimation, which, as will be pointed out later, is a defense reaction. In this way the bacteria are removed from their original area and settle upon a more or less distant part of the conjunctiva and set up a focus of new infection. In the course of time the entire conjunctiva, both bulbar and palpebral, is involved.

The period of complete involvement varies considerably since some bacteria proliferate much more rapidly than others. For example, infections caused by the pneumococcus or the Koch-Weeks bacillus generally produce symptoms by the second day, sometimes even as early as the end of the first day. Scrapings made from inflamed areas at that time and stained with Giemsa show epithelial cells covered with a turf-like growth of organisms (*Figs. 2* and *3*). On the other hand, a gonococcal inflammation is rarely observed before the third day after the introduction of the initial organism.

In the case of the three microorganisms mentioned above, the proliferation generally begins on the bulbar conjunctiva, spreads at first rapidly over its entire surface and then more slowly and more sparsely over the palpebral conjunctiva. In all stained specimens which disclose connecting epithelial cells with turf-like growths of bacteria the greatest concentration of bacteria is found at the cell borders (*Fig. 4*). A possible explanation is that the food supply is more plentiful at that location. It is an astonishing observation to find that the cornea also is covered early with a dense growth of bacteria without exhibiting any clinical evidence whatsoever of an infection (*Fig. 5*). It is true that in the case of the gonococcus an ulcer of the cornea may form later in the course of the infection, but long before this occurs the turf-like growth of bacteria has probably completely disappeared from the corneal surface. It is probable that a combination of other factors stimulates the formation of an ulcer.

(C) *Aggravation of Infection by Bacterial Derivatives.*—(1) Whenever the epithelial cells have harbored a growth of bacteria for a few hours or less, breaks are found to occur at the borders of the cells and this permits the extension of bacterial growth around the margins of the cells. Since dead bacteria with their resultant endotoxins are absent at this stage, it has

Fig. 4
Concentration of Koch-Weeks bacilli at the borders of connecting epithelial cells. X 1000.

Fig. 5
Pneumococci scraped from the surface of clear cornea. No epithelial cells. X 1000.

been postulated that the ectotoxins[2] of bacteria growing on the surface of the living cells bring about the dissolution of the intercellular-cement substance. This in turn allows the bacteria to penetrate to the deeper tissue, so that bacterial growth progresses not only around the margins of the cells, but even on the posterior surface of the cell. This can be seen from stained scrapings made at this time (*Figs. 6* and *7*). The dissolution of intercellular- and interlamellar-cement substance and the invasion of bacteria continue until all the cells and all the layers become affected to a greater or less extent.

(2) The secretion by certain bacteria of substances known hypothetically as aggressins[3] has the power of keeping leucocytes away from the bacteria. Just how much part the aggressins of the bacteria play in the offensive mechanism against a mucous membrane it is impossible to state; nevertheless reference to these bacterial derivatives should be included here because it is possible that they may add to the complications and severity of the disease. In the case of the virulent staphylococcus and *Streptococcus hemolyticus* and *Streptococcus viridans,* all of which have not definitely been proved to be parasites producing acute inflammation of the conjunctiva, an aggressin called leucocidin has been demonstrated which has the power of injuring or of actually killing leucocytes. In the case of the *Streptococcus hemolyticus* and staphylococcus the ectotoxins also produce hemolysis of blood cells. In addition the *Streptococcus hemolyticus* secretes a specific toxin as, for example, the streptococci of scarlet fever,[4] erysipelas[5] and puerperal fever.[6] However, *Streptococcus viridans*[7] liberates an allergizing substance, which increases the susceptibility of the tissues to the toxicity of the bacteria and its products.

(3) The possession of a capsule by bacteria as exemplified by the pneumococcus bestows upon the organism a definite and important weapon of offense. The capsules differ chemically from the fixed types of pneumococci[8] and each is therefore immunologically specific and unrelated. Consequently immunity against one type of pneumococcus does not protect against infection due to the other types. It is known, moreover, that the capsular material is associated with the degree of virulence[9] and invasiveness of the pneumococcus; so that the more stable the combination of carbohydrate to the

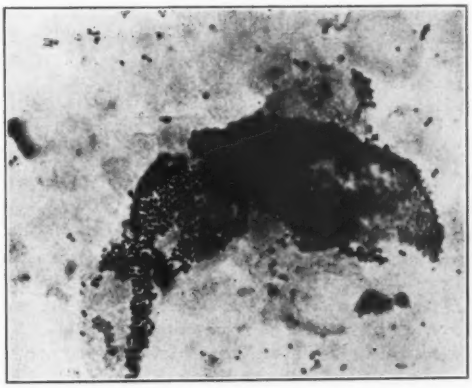

Fig. 6
Gonococci growing on the anterior surface of three epithelial cells. Lindner's contrast stain. X 1000.

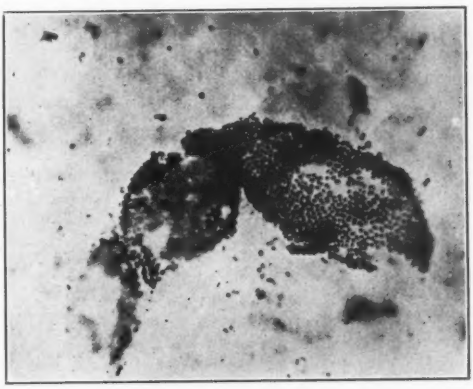

Fig. 7
Same cells as in Fig. 6, showing gonococci on the posterior surface of the cells.

proteins of the organism,[10] the more invasive is the organism. Thus, Type I pneumococcus, which possesses the carbohydrate in the strongest chemical linkage, is the most invasive of the fixed types. The virulence of encapsulated bacteria may well be due to the fact that normal body cells are not capable of phagocytosing capsule-bearing organisms. Until the body acquires a distinct resistance or immunity, the bacteria are capable of unrestrained multiplication and invasiveness. However, as will be pointed out, the body tissues establish later in the course of the disease both a specific and a non-specific resistance, which is able to combat successfully the effects of the infection. In this connection it is of interest to point out that pneumococci have been found to cause acute inflammation of the eye. Bacteriological studies conducted on pneumococcus infections of the eye indicate that strains of all three fixed types are capable of inducing ocular disease, but that Type I is by far the most virulent.

(II) DEFENSIVE REACTION OF THE TISSUES

(A) *The Mechanical Factors in the Reaction of Defense.*

(1) *Exfoliation of Epithelial Cells.*—When the cement substance which holds together the individual epithelial cells and the layers of cells is dissolved as described above, there is sooner or later an exfoliation of cells, sometimes in large patches. In one sense this exfoliation may be considered as a defense reaction, since large numbers of bacteria are thereby eliminated. As successive layers of cells become superficial, they, in turn, are cast off until the bacteria finally disappear. But there are other factors than exfoliation which contribute to the disappearance of the parasites. Desquamation of the epithelial cells is also brought about and accelerated by cellular edema, which will be shown below to be due to irritation created by the bacteria.

(2) *Lacrimation, Hyperemia, and Edema.*—The irritation locally induced by the bacteria and their products leads first to lacrimation. The copious flow of tears obviously tends to wash away bacteria. The irritation finally creates a condition of hyperemia and edema of the subconjunctival tissue, which plays a defensive role in the following manner: while the epithelial cover of the eye remains intact it is not possible for fluid to diffuse through from behind, but as soon as breaks in the wall follow the action of toxic substances, an oozing of serum from the subconjunctival tissue begins and later increasing numbers of leucocytes appear to produce an exudate. Numerous bacteria are thereby carried by the current from the cellular structure into the conjunctival sac. Along with the exudation of serum and leucocytes a cellular edema occurs, and, as already stated, this accelerates the exfoliation of surface cells.

(B) *Factors Normally Resistant to Infection.*

(1) *Lysozyme.*—Recent work[11] has shown that among the natural resistant forces of the eye there is a substance which has been called lysozyme. As the name implies, this substance has the ability to cause complete lysis, or dissolution, of a number of bacteria. The lysozyme is contained in the tears and is particularly effective against the gram-positive organisms. The discovery of this property of tears is too recent to allow more than a passing reference to its possible role as a normally occurring agent of defense against bacteria.

(2) *Phagocytosis.*—Phagocytosis of certain bacteria is the normal property of body cells. Since the degree of phagocytosis is specifically increased in infection and immunization, it will be considered in greater detail below, when the immunity reactions are discussed.

(C) *Factors Specifically Induced by the Infective or Toxic Agents.*

(1) *Resistance of Repaired Tissue.*—As the destroyed epithelial cells are replaced by the new growth, a concomitant resistance against the destroying agent is developed in the cells. The experiments of MacNider[12] on nephritis in dogs illustrate this point very well. He has shown that in mild uranium nitrate poisoning affecting the kidney the epithelial cells of the proximal convoluted tubules are destroyed and replaced by new cells, which apparently are functionally normal, but no more resistant to the chemical agent than were the original cells. When, however, the uranium poisoning is more severe the new cells that replace the destroyed cells exhibit a marked resistance to subsequent poisoning. This is obviously an extremely important defense and one which is not associated with the presence of specific antibodies.

(2) *Phagocytosis by Leucocytes.*—While phagocytosis apparently plays an important part in the recovery from many infections, it is not clear how the process is accomplished, nor is it certain that it plays a major part in defense in the case of conjunctival infections. Some observers even feel that phagocytosis is fraught with certain disadvantages to the body, partic-

ularly in that the phagocytes act as vehicles in transporting the bacteria from one area to another. This could not be claimed for an external eye infection. There can be no doubt, however, that phagocytosis actually aids in the destruction of bacteria. As a general rule the capacity to ingest bacteria is a normally occurring phenomenon. This is seen most strikingly in infections due to organisms like staphylococcus and streptococcus. Consequently, an increased resistance in such a case merely implies the exaltation of a capacity already present. On the other hand, phagocytosis of encapsulated bacteria, such as pneumococcus, does not occur normally and can be stimulated as a new function only by artificial immunization or infection. In the latter case it is now known that phagocytosis occurs because of the presence of specific antibodies occurring in the serum and formed *de novo*. This is demonstrated when immune serum is administered during the course of infection by the fact that phagocytosis by the body's own cells, previously absent, immediately occurs when the serum is provided.

Phagocytosis is accomplished by the leucocytes, particularly the polymorphonuclear and the mononuclear cells. Usually the process is one which is first participated in by the polymorphonuclear cells and the relative number of these cells usually indicates the degree of acuteness of the infection. Subsequently the mononuclears appear and phagocytose so completely that they ingest not only bacteria but polymorphonuclear leucocytes and dying tissue cells as well.

In all stained sections of the conjunctiva examined by the writer he has never seen leucocytes with ingested bacteria lying within the epithelial structure. It may be that the leucocytes have no power to pick off the bacteria clinging tenaciously to the epithelial cells, and that the passage of the leucocyte through the fissures in the mucosa is too rapid to be effective against the parasites. Regarding this, we are sure of one thing, and that is that we are able to obtain material from the conjunctival sac at the proper stages in most acute purulent infections of the conjunctiva, which contains many leucocytes with bacteria within them. Whether leucocytes only phagocytose bacteria which have been loosened from their host by other factors is impossible to state.

(3) *Phagocytosis by Tissue Cells as Exemplified by Conjunctival Epithelium.* It is a well-known fact that certain fixed cells like those of the spleen and liver[13] have the power of phagocytosing foreign substances, including bacteria. Some years ago it was pointed out by Lindner,[14] Pascheff[15] and later by the writer[16] that in certain acute conjunctival infections, like that due to the gonococcus, phagocytosis of bacteria by some of the newly formed epithelial cells takes place. The term "phagocytosis," of course, connotes not only ingestion but digestion. It occurs early in the second week of the infection and seems to be one of the last lines of defense against the invading organisms. In order to show that the bacteria have been ingested and that they are not merely growing on the surface of the cell as they do on the superficial cells in the early stages of the disease, it is necessary to use wet-fixation methods of preparing the conjunctival scrapings. These methods prevent the drying out and collapse of the cells and permit them to maintain their original shape to a degree. Within the protoplasm of a cell thus prepared and then stained with Giemsa solution it has been possible to count as many as thirty well-stained gonococci by focusing upon different planes of the cell with an oil immersion lens (*Fig. 8*). That this is a true phagocytosis is suggested by the find-

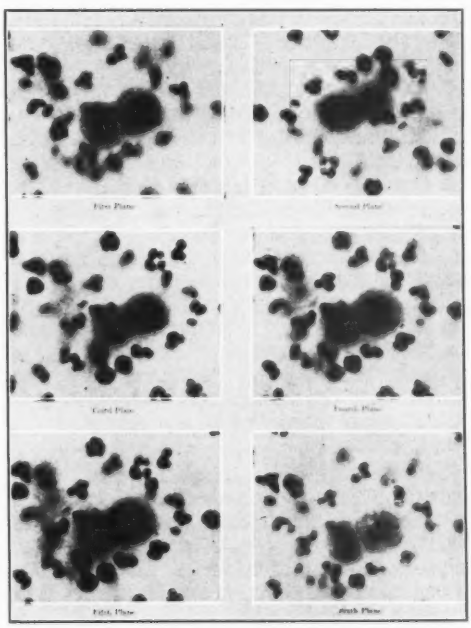

Fig. 8

Phagocytosis of about thirty gonococci by one epithelial cell prepared by wet-fixation methods and stained with Giemsa. X 750.

ing of other epithelial cells containing gonococci with little or practically no staining and finally cells in which the organisms appear to be disintegrating. In other words, we apparently see here the same process of ingestion and of digestion of bacteria as that performed by leucocytes.

In cases of gonorrheal ophthalmia in children, who usually do not require treatment with a foreign protein, this process of epithelial-cell phagocytosis has been observed to continue for two or more weeks. The process has also been seen in cases of pneumococcal conjunctivitis, but in this disease the bacteria disappear from the tissues generally on the third day, so one must make frequent and early scrapings in order not to miss seeing this phenomenon. In infections of the conjunctiva by the Koch-Weeks bacillus, the process of epithelial-cell phagocytosis is most pronounced, but here, too, the invaders disappear completely by the third or fourth day.

(4) *Antibodies.*—Since the formation of antibodies requires a definite period of time approximating a week, it is evident that whatever part is played by them must occur later in the infection. We have seen how in phagocytosis by leucocytes the presence of serum antibodies, known as tropins in this case, play a preparatory role in the ingestion of bacteria. The presence of agglutinins also assists phagocytosis by rendering bacteria immobile and coating them with immune serum. In a similar fashion precipitins render insoluble material in solution and in this way phagocytosis is accomplished at the same time that the material is made less diffusible. Complement-fixing antibodies possess the property of lysing or dissolving bacteria. It is questionable, however, whether antibodies exert a great influence in infections of the eye. Here the infections are usually so well localized, and it is known that local infections may give rise to a local immunity where phagocytosis[17] plays the predominant role. Furthermore, there is no evidence that the same area of conjunctiva is involved more than once in the course of the same infection.

(5) *Immunity in the Absence of Antibodies.* The experiments conducted on local infections of the skin with pneumococcus provide analogies which are quite *a propos* in this connection. Following such infection, no specific agglutinating or protective antibodies are demonstrable in the serum of the recovered animals.[18 19] Nevertheless, the animals show a high degree of acquired resistance to subsequent infections and, peculiarly enough, the resistance is equally effective against infection not only by the type of pneumococcus present in the original infection, but against infection by the other types as well. Furthermore, this variety of resistance cannot be transferred from one animal to another. It would seem, therefore, that in localized infections the resistance acquired is purely a local tissue resistance in which even phagocytosis by the leucocytes is absent. In the light of our present knowledge it is difficult to explain this phenomenon. It may well be as has been suggested that an enzyme is formed which is capable of dissolving and digesting the bacteria. This would appear possible from the fact that the bacteria in local infections frequently lose their antigenic properties and consequently specific antibodies are not found. It would be idle at the present time to speculate further on the nature of this resistance.

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DISCUSSION (*Abstract*)

Dr. John O. McReynolds, Dallas, Tex.—The paper which we have just heard should be studied in conjunction with the more elaborate presentation read before the American Ophthalmological Society and published in the *American Journal of Ophthalmology*. In this earlier discussion are given the beautiful microphotographs showing the striking turf-like accumulations of bacteria in relation to the epithelial layers of the conjunctiva and cornea, together with the phagocytic role of these cells in the defense of the eye against infection.

Dr. Howard's patient and painstaking labors have enabled him and the entire medical world to name and describe the biological activities of the parasitic bacteria

that grow upon living epithelial cells, and also to show the scope and behavior of the saprophytic organisms that feed upon the dead cells floating in conjunctival secretions. His description of the first, second, third and fourth lines of defense against destructive infections has given us a clearer conception of the processes involved and thus a basis for a more rational therapy and a more dependable prognosis.

Dr. Howard has proven what others have taken for granted and instead of studying smears and cultures from dead tissues, he has made an active study of the living cells under attack by parasitic organisms.

The chief interest of his work centers upon epithelial cell phagocytosis and the offensive and defensive influence of toxins, the growth and exfoliation of cells and their rapid reproduction, antibodies and other means of local resistance.

Dr. Charles A. Bahn, New Orleans, La.—The conjunctiva and cornea are protected against ectogenous infection principally by, first, the tears; second, the conjunctival and corneal epithelial cells; third, the lymph before and after alteration by bacteria and other toxins; and fourth, by mesodermal phagocytosis.

The tears contain bactericidal substances. Among these is lysozyme, which is being studied both in this country and Europe.

The author's extensive researches have shown that epithelial cell phagocytosis plays an important part in the pathology of many ocular infections. Will Dr. Howard tell us more about the relationship of epithelial cell phagocytosis to the inclusion bodies which are found in trachoma, gonorrheal conjunctivitis, swimming tank conjunctivitis, and inclusion gonorrhea? What role does it play in the pathology of ocular diseases transmitted by filterable viruses?

Important investigations are being made on the chemistry and mechanism of inherited and acquired immunity, which largely determines our ability to suppress infectious diseases. Tests such as the Schick are being adapted to various diseases to determine our individual sensitiveness at a specific time. The variations of immunity caused by fatigue, emotional shock, endocrine dysfunction and other causes open a fertile field for important future investigations.

The author's statement that the staphylococcus and streptococcus are not definitely proved parasites in the conjunctiva is somewhat contrary to our previous views. I, for one, have thought that these organisms could produce a definite and specific conjunctivitis.

Interesting also is his statement that antibodies are not artificially formed in the blood stream in less than about ten days. A part of the beneficial therapeutic effect often observed within 24 hours after parenteral protein injections is thought to be due to antibodies produced by the injection.

Dr. Dunbar Roy, Atlanta, Ga.—Fifteen or twenty years ago Dr. Reese, in operating upon a cataract one day, called my attention to the fact that infection following these operations did not depend so much upon the microorganisms that were inside the lids and around the eye as it did on the trauma to the cells at the time of making the incision. If we make a thoroughly clean incision without bruising the cells through which the knife passes, we get better results.

In combating infection that is already established are not certain germ-destroying remedies that we frequently use strong enough to cause a breaking down of the cells and therefore an opening up of an avenue for reinfection? In many cases is not constant irrigation with mild solutions better than the use of a strong germicide?

Dr. Howard (closing).—I have thus far given only a brief summary of my paper which when read in full will answer all the questions that have been asked. I will take the remaining time allotted me in showing several lantern slides and explaining them. These illustrations and their explanations are included in the paper.

PTOSIS AND TORSION OF THE GALL-BLADDER*

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and
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Developmental anomalies furnish an interesting field for study both from the embryologic and clinical standpoints. These conditions are often discovered incidentally and are of no clinical significance; they often only impair comfort and usefulness to a varying degree, but they may become of sufficient importance to destroy the patient's life. The size, position, fixation and mobility of abdominal viscera may depend to a large degree upon embryologic development. This factor is often responsible for inguinal hernia in the descent of the testis. Renal, ureteral and bladder anomalies may also be of great surgical importance.

A study of the development of the mesenteries and peritoneal ligaments shows interesting mechanical factors at work and structures formed and resorbed which result in variable relationships in the adult. The rotation of the intestinal loop around the superior mesenteric artery with a continuous primitive mesentery, then subsequent disappearance by adhesions to the posterior abdominal wall of that portion suspending the ascending and descending colon brings about a variable attachment. The "fixed" portions of the large bowel are thus often mobile. The disposition and size of the peritoneal fossae are inconstant. The mesentery of the duodenum disappears in embryonic life, resulting in a variable attachment, and the amount of fixation of the gall-bladder to the under surface of the liver is

*Read in Section on Surgery, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

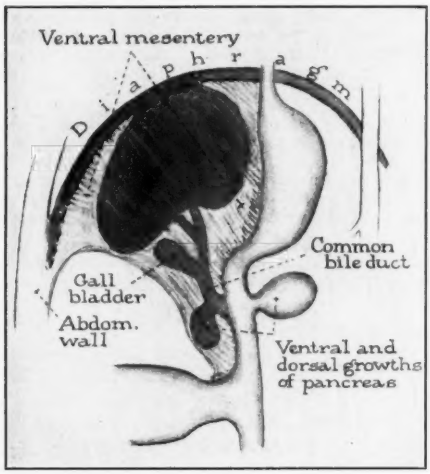

Fig. 1
Schematic drawing of embryological development of gall-bladder and liver.

also inconstant, a factor responsible for the acute abdominal emergencies hereafter described.

The separate embryological development of the gall-bladder and liver affords excellent opportunity for this variation. Both are entodermal in origin, the liver arising first as a diverticulum from the primitive gut just before its opening into the yolk sac. Two solid buds of cells are next given off which represent right and left lobes of the liver, and the original diverticulum becomes the common bile duct (*Fig. 1*). From the wall of the latter another outpouching is formed, which grows forward between the two layers of ventral mesentery forming the gall-bladder and cystic duct. It is thus seen that the liver and gall-bladder arise as separate diverticula at different stages of embryonic development and that both grow within the ventral mesentery, conditions which favor anomalous anatomic relationships in adult life.

A consideration of congenital anomalies shows there is no part of the biliary apparatus except the liver which may not be absent. This is not especially to be wondered at in the case of the gall-bladder and cystic duct in the human subject. They are normally wanting in certain animals, are not essential, and are often found obliterated by disease. But when it is found at birth that the hepatic and common bile ducts are represented by mere fibrous cords and that life in some instances has been possible for as long as six months, variable anatomic relationships of the gall-bladder to the under surface of the liver are to be expected.

Abnormal position of the gall-bladder may also be due to pathologic conditions. Eisendrath classifies all causes as follows:

(1) Changes in the form and size of the liver. In sclerosis of the liver, the gall-bladder may be carried up under the ribs, while in enlargements of the liver it may be displaced downward, and has been known to reach as far as the pelvic cavity.

(2) Adhesions between the gall-bladder and intestines causing it to be dragged out of position.

(3) Changes within the gall-bladder itself, chiefly that of distention. The gall-bladder may vary in size from that of a cherry to the proportions of an abdominal tumor.

(4) The presence of a distinct mesentery which may gradually lengthen until a condition of ptosis of the gall-bladder is established.

In the normal condition, the gall-bladder is attached to the liver, but not very strongly, by connective tissue and peritoneum which is continuous with that of the liver. According to Brewer, one-third to one-fourth of its surface is uncovered by peritoneum, and that portion adheres to the liver throughout its length, with but little tissue interposed. It thus leaves an area of denuded liver when removed, to which some abdominal structure may adhere. In rare cases, the gall-bladder is found almost entirely embedded within the liver, and its surface may be completely hidden.

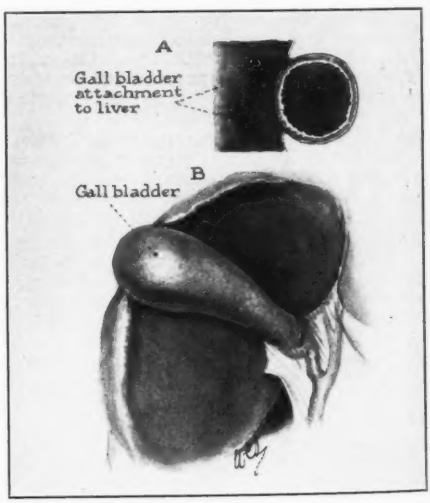

Fig. 2
Normal adult relationship of gall-bladder and liver. A, Cross section showing gall-bladder contiguous to liver. B, Under surface of liver.

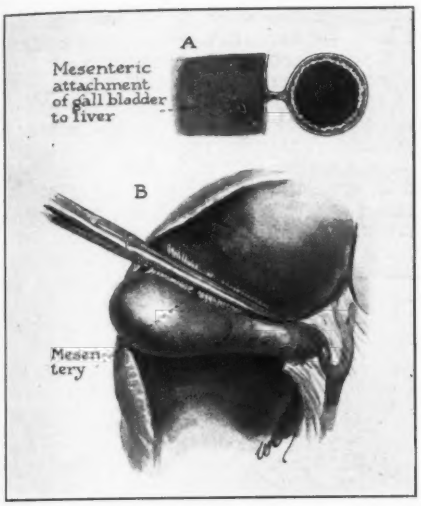

Fig. 3
Gall-bladder attached to liver by a complete mesentery. A, Cross section. B, Clamp on mesentery.

The relationship of the gall-bladder to the liver may show an anomaly by being less secure. The attachment may be continuous throughout the entire length of the gall-bladder, but it nowhere touches the liver. It is thus suspended by a mesentery-like peritoneal reduplication, which is prolonged into the peritoneal covering of the liver. Brewer found a gall-bladder mesentery in five of one hundred post mortem examinations, which agrees in the main with Suslow's findings of six cases out of 145 examined. Such a gall-bladder is usually freed from the liver with little difficulty and may leave no area of denudation on the liver.

A far rarer anomaly is seen when the mesenterial fold on which the gall-bladder is suspended does not extend the entire length, but is very narrow so that the organ hangs by a frail stem. Such a narrow mesentery usually terminates near the point where the cystic duct joins the gall-bladder, and the latter is entirely covered by peritoneum and hangs free. The weight and freedom of motion of a floating gall-bladder usually results in lengthening of the pedicle so that cholecystectomy is a very simple procedure consisting only of clamping, cutting and ligature of the pedicle. Lutkins concludes that the ptotic type represents about 20 per cent of all subjects.

A convenient surgical and anatomical classification of these relationships includes three groups: first, the normal condition (*Fig. 2*); second, a complete gall-bladder mesentery (*Fig. 3*); and third, the floating gall-bladder with a pedicled mesentery entirely surrounded by peritoneum and hanging free (*Fig. 4*).

PTOSIS OF THE GALL-BLADDER
(*Cholecystoptosis*)

Ptosis of the gall-bladder may occur in association with ptosis of other abdominal viscera or be present independently. The condition may produce no symptoms or the complaint be so vague and generalized that the true diagnosis is not suspected or can be made only after a very minute and methodical examination. Cholecystography may prove of value.

The pedicle and neck of the gall-bladder may be subject to flexion and torsion. This causes temporary occlusion, resulting in stagnation of bile and irritation of the mucosa, which reacts by abundant secretion. By contraction of the diaphragm, peristalsis of the colon or change in posture, the gall-bladder may raise itself, the flexure disappear, and the gall-bladder empty. On the other hand, the growing weight may increase the flexure until occlusion becomes permanent. In this case, the gall-bladder may assume an enormous size.

The symptoms of flexion and incomplete torsion are abdominal distress, colicky pains and digestive upsets. The attacks of pain may be violent and frequent. They are generally localized in the region of the gall-bladder and radiate to the interscapular region, abdomen or lumbar region. Pains usually bear no relationship to

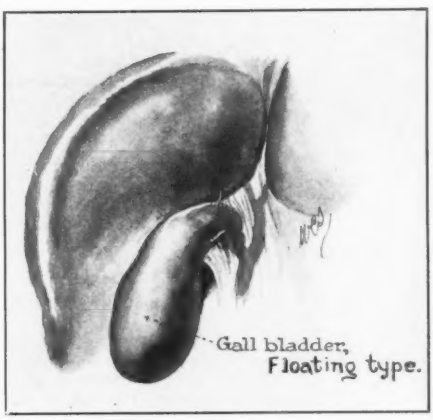

Fig. 4
Gall-bladder entirely covered by peritoneum and freely floating from its pedicle.

indigestion of food, but they may be accompanied by nausea and vomiting. These attacks decrease after a variable time to reappear and disappear successively. This condition may last for months or years and the attacks become more frequent and severe until the general condition becomes bad, anorexia is marked and the nervous system becomes altered.

The epigastrium and hypochondrium are very tender and pressure is insupportable. The patient remains immobile in bed, assuming a position which relaxes the abdominal muscles. Jaundice is not common. Rarely the vesicular tumor can be perceived by palpation. The patient is usually a multiparous woman in whom there is pronounced enteroptosis. There may be nephroptosis, inguinal hernia and prolapse of the rectum or uterus.

These visceral displacements produce a whole train of complicated symptoms.

Differential diagnosis must be made from cholecystitis and cholelithiasis without ptosis, hydatid cyst, abscess and cancer of the liver, perforating peptic ulcer, lesions of the pancreas, appendicitis, floating kidney, hydronephrosis, and tumor of the abdominal wall. The following case is of interest, details of which have been furnished us through the kindness of Dr. J. H. Dodson, of Mobile:

CASE HISTORY

Mrs. W. was thirty-five years of age, and had given birth normally to two children. She had had a pelvic operation ten years before our operation, which she stated had been followed by complete relief. For a period of about twelve years she had suffered indigestion and abdominal distress of a mild degree. This trouble was periodic and bore no relationship to the ingestion of food or the quality of food taken. She had used digestive powders and cathartics during this time without benefit. During the past three or four years this trouble had become greatly aggravated. The abdominal distress had increased in severity and sometimes there were colicky pains, usually confined to the upper abdomen. She became nauseated, and vomiting was frequent. Jaundice was never present. The loss in weight became so severe that she spent considerable time in bed and there was a noticeable loss in strength when she was up and about.

Two years before she was hospitalized for anchorage of a floating kidney, but changed her mind and left the hospital without operation.

Physical examination showed extreme emaciation. The abdominal wall was flaccid and very thin, so that the vertebral column could be very easily palpated. A tender tumor mass, about the size of a large kidney, could easily be palpated on the right side. This was freely movable and could be manipulated into almost any position within the abdomen, even into the left lower quadrant. It was most easily manipulated into the upper right quadrant, where it would partially disappear in an area thought to be the kidney fossa. Examination showed the blood and urine to be normal. After being bed-ridden for two months, with aggravation of all symptoms, she consented to operation. An upper right rectus incision was employed and the operator first searched for the gall-bladder in the usual location and could not find it. Palpation of the right kidney showed it to be present and not movable. The tumor was then manipulated into the incision and delivered outside and found to be a gall-bladder with a long pedicle. Removal was easily performed by merely clamping, cutting and ligature of the pedicle.

Examination of the specimen showed the gall-bladder was about the size of an adult fist, hard in consistence, and content was under great pressure. Incision of the walls showed a content of mucoid bile, with a stone impacted in the cystic duct about 2 by 2 by 2 cm. in size. The wall of the gall-bladder was stiff and fibrotic and estimated to be about one-half inch in thickness.

Convalescence was uneventful and there was complete disappearance of symptoms and a rapid gain in weight and strength, and she has been in normal health up to the present, which is about seven years after operation.

TORSION OF THE GALL-BLADDER

Complete torsion or volvulus of the gall-bladder is a rare condition and the most serious complication that can happen in ptosis. It is necessary to distinguish between incomplete and complete torsion. In the former, the circulation is incompletely obstructed from a partial or beginning twist of the pedicle and produces symptoms resembling cholecystitis or lithiasis, and should be grouped with these cases of angulation or flexure of the cystic duct.

When complete torsion is present the twisting of the pedicle has progressed to a point sufficient to strangulate the blood supply and obstruct the cystic duct so that gangrene of the entire organ results. Our search of the literature reveals only 25 such cases, which makes the condition of sufficient rarity that a brief synopsis seems warranted.

CASE HISTORY

Mrs. N. is a well-nourished white woman of fifty-seven years, who had typhoid fever at the age of thirty, which lasted forty days. She had a mild attack of malaria at the age of thirty-five. She was married at seventeen, has eight children living and one dead. For the last five years she has had severe attacks of abdominal pain, which was generalized over the right side of the abdomen.

When first seen at 11:00 o'clock in the morning, she stated that she was awakened at 5:00 that same day

by a pain extending around the right costal margin to the inferior scapular area. There was mild continuous pain in this area with colicky pains occurring about every five minutes. A quarter grain of morphine sulphate administered hypodermically gave relief. The same night about 1:00 o'clock the patient was again found in agony and a quarter grain more of morphine was given, since there was as yet no definite diagnosis possible and the pulse was moderately increased with no fever. The next morning about 8:00 o'clock the patient was brought to the Atmore Hospital, where she was cystoscoped. The patient had not voided since the beginning of the attack twenty-four hours before and a few ounces over three quarts of urine were obtained from the bladder at this time. The b'adder, right ureter and kidney were examined, but no condition was found to account for the pain in the right side of the abdomen. For several hours following the cystoscopic examination and the emptying of the bladder the patient rested fairly well, but about 4:00 o'clock in the afternoon a more definite localization of the pain occurred in the gall-bladder area. At this time Dr. Meeker was called in consultation and he concurred in a diagnosis of gall-bladder disease. The patient was brought to the operating room about 5:30 and operation performed by Dr. Lisenby, assisted by Dr. Meeker.

On opening the abdomen a large thick walled, black gall-bladder was found twisted in a clockwise direction on the cystic duct. Cholecystectomy was easily performed and the abdomen drained with a size twelve F. catheter.

On opening the specimen a content of bloody mucus and clots escaped. No stones were present. The wall was about a centimeter thick, fibrotic and edematous. The mucosa was uniformly smooth inside.

The patient made an uneventful recovery and she had no further troub'e in the abdomen six months later.

COMMENT

An analysis of the reports of these 26 cases shows many interesting features. This condition is usually found in old people in whom the elasticity of the walls of the gall-bladder has considerably diminished. In young people, the elasticity probably prevents volvulus. The patients were all women except three. The condition is most frequently seen after the fiftieth year. Nineteen of the recorded cases had reached that age and roughly half of these were seventy years and upwards. The oldest patient was a woman seventy-nine years old. The youngest was a woman twenty-three years old, in whom the gall-bladder perforated and 213 stones were found. This was the only case in which perforation had taken place.

In the majority of cases the onset is sudden, sometimes without history of previous abdominal discomfort. The patient is brought to the surgeon in a very grave condition. Collapse, rapid pulse, peritoneal facies, vomiting and woody abdomen make the condition of acute surgical abdomen apparent. The abdomen is very sensitive, so that the muscular defense does not allow accurate palpation. In 14 cases, a mass in the right upper quadrant was felt, and in nine it was stated that a mass could not be made out. Jaundice is usually not present. Its absence was noted in 15 instances and its presence was not recorded in a single case. This is not surprising since the obstruction involves the cystic duct only, and there is usually but little infection present. Fever is not a constant symptom and when present is usually of low grade. The pulse is fast and thready.

The diagnosis was not made positively before operation, but the condition of acute surgical abdomen was recognized and exploratory laparotomy revealed the true condition. In Krabbel's second case only was the true condition suspected. In nine instances the preoperative diagnosis was acute cholecystitis, in two cases cholelithiasis, in three cases ileus was thought to be present. In several the condition was thought to be acute appendicitis with peritonitis; in two cases acute perforated peptic ulcer was diagnosed, and in one patient a twisted ovarian cyst was thought to be present. In a few instances acute surgical abdomen only was diagnosed.

The treatment should be rapid cholestectomy with drainage. This is usually very easily performed, since the pedicled gall-bladder floats free in its bed, with only occasional easily separated fibrinous adhesions. Twenty-four of the 26 patients were operated upon, of which 21 recovered.

The gross pathologic picture is fairly constant. The gall-bladder is nearly always enlarged, tensely distended, its greatly thickened walls are smooth on the outside, and the color a purplish black. The content is bloody, clots often being present. Various degrees of necrosis were present, depending upon the duration of complete torsion. In only a single instance was the gall-bladder perforated, although in two cases the histories showed eight days and six days, respectively, to have elapsed between the beginning of the attack and operation. The average interval from the appearance of symptoms of com-

plete torsion and operation was about forty-eight hours.

There was usually but little evidence of spreading peritonitis. Necrosis was confined to the gall-bladder only down to the point of strangulation of the pedicle. Most surgeons report the presence of a moderate amount of bloody serous fluid in the peritoneal cavity.

The direction of torsion is apparently not a matter of significance. In many cases this feature was not mentioned. In ten it was clockwise and in five counterclockwise.

Stones were found in the gall-bladder in eight cases, and in none was there an impacted stone in the cystic duct with hydrops. Stones were not reported in either the hepatic or common ducts. We do not believe that stones play a significant part in torsion and that their presence is secondary to ptosis. The essential condition is the anomalous pedicled attachment already described, resulting in a floating gall-bladder.

SUMMARY

Cholecystoptosis results primarily from congenital anomalous attachments of the gall-bladder. Further pathologic changes are usually dependent upon ptosis.

The most serious complication that can happen to a floating gall-bladder is that of complete torsion.

Our case of torsion illustrates the main features of this condition exemplified in the group of 25 reported cases, namely: (1) previous history of "bilious" attacks; (2) the failure of preoperative diagnosis; (3) the age and sex, elderly females; (4) the sudden onset and picture of acute surgical abdomen; (5) the gross pathology, a greatly enlarged freely floating pedicled gall-bladder of purplish black color, thickened edematous walls, content of bloody bile and clots and no stones present; (6) easy cholecystectomy with complete recovery.

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DISCUSSION (*Abstract*)

Dr. Edwin P. Lehmann, University, Va.—I was interested in Dr. Meeker's classification of the three grades of attachment of the gall-bladder to the liver. We see a great many half-way stages, particularly between the gall-bladder which has a normal attachment over part of its course with a considerable floating end. That type I have recognized more than once before operation. Other cases may be due to cholecystoptosis. They show frequently duplication of the gall-bladder angulated over itself at its free end.

Dr. Meeker (closing).—This is an acute surgical condition and an accurate preoperative diagnosis of the underlying pathology is not necessary. Operation in all cases is very easily performed and results are uniformly good.

THE BLOOD PICTURE IN SICKLE CELL ANEMIA*

By L. W. Diggs, M.D.,
Memphis, Tenn.

The excuse commonly given for a case report of sickle cell anemia is that the condition is interesting because it is rare. In our experience it is the most common primary blood dyscrasia in negro hospital patients. The reason for this paper on the blood picture in sickle cell anemia is that the condition is unrecognized, and a knowledge of the blood picture is necessary for its recognition.

Although the characteristic hematological findings have been clearly stated in the past by Sydenstricker,[1,2] Graham,[3] Steinberg[4] and other students of the disease, there still occur in the meager treatment of the subject in recent reference books gross misstatements; and in the literature confusing terms and unwarranted generalities based upon inadequate evidence.

In this paper the essential facts in regard to the blood findings will be restated and interpreted in the light of our observations and analysis of the literature. The material upon which this work is based consists of 64 recorded cases[5 to 45] of sickle cell anemia, to which we add the blood picture of ten cases observed at the Memphis General Hospital. Nine of these ten cases have been personally studied within the past two years. The average figures to be given for the various blood elements were obtained by taking the averages of the available data on individual cases, and from the sum of these individual averages computing the final mean.

The discussion will be limited to the blood picture in the active or severe phase, the essential features being an anemia of the hemolytic type, with regenerative signs, occurring in one possessing the sickle cell trait. Non-anemic cases whose erythrocytes sickle in moist preparations, but whose blood is otherwise normal (sicklemia[15]) will not be considered. Between the two extremes of the non-anemic and severely anemic patients there lies a large group of intermediary cases, called by Huck[10] mild cases. The term latent sickle cell anemia[9] is confusing and is to be avoided. The status of this borderline group is as yet not clearly enough established to define sharply. The blood picture, however, in slightly anemic sicklers is not characteristic. It is only when the anemia becomes severe that the diagnostic findings become manifest.

One of the essential features of the blood picture is found when a drop of blood is sealed under a coverslip and observed over a period of hours.

At the time the preparation is made, slender, elongated, pointed and sickled forms are seen in some active cases, but not in all cases. These circulating blood types differ from the forms which later appear in that they are more highly refractile,[32] more uniform, and do not have the same multi-pointed and burred shapes. They also do not have the same property of rounding up on exposure to air as do the later appearing and more fantastically spiked types. The average rate of sickling in moist preparations in cases of severe anemia is more rapid, the cells sickle in higher percentages and more consistently than in non-anemic cases or in mild cases with temporary anemic episodes.[46] The height of the curve is usually reached in 18 to 24 hours. On standing the cells eventually round up.

It is to be emphasized that the presence of sickled cells in the moist preparations does not alone make the diagnosis of sickle cell anemia. The anemia must be associated, and moreover it must be a hemolytic type of anemia with active regenerative signs. The presence of the sickle cell trait in association with secondary anemia, which often occurs in hospital patients as a result of infection, faulty nutrition or cachetic diseases, likewise does not make the case one of sickle cell anemia, but merely secondary anemia superimposed on the sickle cell trait.

The red cell count in 72 cases averaged 2,600,000 cells per cu. mm. An analysis of the distribution of these cases according to the number of erythrocytes reveals a range all the way from a low normal to very severe grades of anemia (*Fig. 1*). This is, in itself, evidence that the condition spoken of as active sickle cell anemia shades off into the non-anemic condition and indicates the difficulty in making all cases fit into definite groups. Cases are observed which at times have a severe anemia of a specific type, and later show practically no points of differentiation from normal negroes in the same environment. Chronic cases, however, occur in which the same cyclic variations are observed, but during the improvement period the normal

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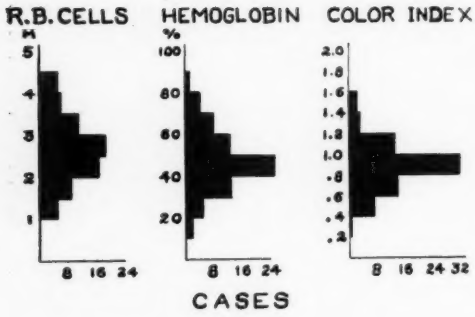

Fig. 1

Chart showing the distribution of cases according to their average erythrocyte count, hemoglobin percentage and color index.

level is not attained. Their level of erythrocytes and hemoglobin seems to be fixed at a lower point and their blood picture remains characteristic.

The average hemoglobin value in 72 cases was 45 per cent. The distribution of cases according to their average hemoglobin percentage (*Fig. 1*) shows a tendency for the hemoglobin to be relatively lower than the red blood cells.

The color index, commonly stated to be 1 or above, proves to be usually below 1 (*Fig. 1*). The mean average of the series (72 cases) is 0.87. Individual cases, and especially severe or uncomplicated chronic cases, show variable color indices, often above 1. In view of the utter unreliability of the methods used to determine hemoglobin and the lack of accurate standards to represent 100 per cent, too much emphasis cannot be placed on the color index as a diagnostic point of value. It is probable that secondary infections and nutritional factors so common in association with sickle cell anemia play a definite part in the production of the hypochromic anemia in the average case.

The volume of packed red blood cells has not been determined on enough cases to warrant definite conclusions. To the one recorded set of values[42] we add the determinations made on four of our cases, and from these five cases the following average values are computed:

R. B. C.: 2,380,000 per cu. mm. (47.6 per cent of normal. 100 per cent = 5,000,000).

Hemoglobin: 42 per cent (7.1 gms.) (42 per cent of normal. 100 per cent = 17 grams).

Volume of packed red blood cells: 18.8 c. c. per 100 c. c. blood (37.6 per cent of normal. 100 per cent = 50 c. c. per 100 c. c. of whole blood).

Color index, 0.88 (normal, 1.00).

Volume index, 0.79 (normal, 1.00).

Saturation index, 1.12 (normal, 1.00).

Mean corpuscular volume, 79 cu. microns (normal, 85 cu. microns).[47]

Mean corpuscular hemoglobin, 29 micromicrograms (normal 29 micromicrograms).

Mean corpuscular hemoglobin concentration, 38 per cent (normal 35 per cent).

From these values it is obvious that the volume of packed red blood cells as determined by the hematocrit methods is decreased out of proportion to the decrease in red cells or hemoglobin. Thus we have a low volume index and a high saturation index. Steinfield and Klauder[24] report a volume index of 0.8 which is in agreement. The average red blood cell in sickle cell anemia is smaller than normal, but on account of an increase in the amount of hemoglobin per unit volume the total amount of hemoglobin in the average cell approaches, or is greater than normal.

In the evaluation of these unusual findings the small number of observations, the possibility of technical errors, and the inaccuracy of standards must be considered. If the high saturation index and the high mean corpuscular hemoglobin concentration are confirmed in subsequent work, it will prove an exception to the widely accepted concept that a given volume of erythrocyte stroma can hold so much hemoglobin and no more.[48]

The reticulocyte count is elevated, often to figures above 25 per cent. The average reticulocyte percentages in 32 cases in which the determination was made was 15. The percentage increases during an exacerbation and decreases with improvement, following in this respect the curve of the nucleated red blood cells. In

Fig. 2

Diagrammatic drawing of a characteristic brilliant-cresyl blue moist preparation from an active case of sickle cell anemia, showing: S, sickled cells; R, reticulated red blood cells; W, white blood cells; N, nucleated red blood cell; P, platelets.

chronic cases the reticulocytes remain consistently elevated (*Fig. 2*). Preliminary rises before improvement or elevations following liver therapy have not been observed. Cells containing reticulum stainable by brilliant cresyl blue have been shown to sickle less readily than nonreticulated cells,[9 20 42] and we have repeatedly confirmed this observation.

An examination of the fixed smears from active cases consistently reveals marked variations in the size, shape and staining qualities of the red blood cells. Both large and extremely small cells are seen. Vacuolated cells, cells with central achromia and irregular hemoglobin distribution, and pale cells are seen. Diffuse basophilia is common. The sickled cells appearing in the blood smear tend to be hyperchromic, and often have moth-eaten appearances.

Premature cells of the erythrocyte series are often the most striking feature of the blood picture as seen in stained smears. The type and number of immature forms is subject to rapid changes and wide variations. Usually a given smear will show evidence of maturation at a given level, but others will show truly a "gay blood picture" in which within a few microscopic fields the whole range of developing cells are displayed. Megaloblasts, intermediary forms, nucleated red blood cells of all descriptions, nuclear fragments and Jolly bodies are commonly found, and often in large numbers. With improvement these immature forms are reduced in number or disappear entirely. Stippled cells and Cabot's rings are less commonly found, but are prominent in some smears, and may simulate malarial parasites very closely.

In reviewing the literature one gets the impression that typical sickled cells are numerous in the stained smears of all active cases. In our experience this concept is misleading. Although elongated and sickled forms are striking and unmistakable in some cases, this is the exception rather than the rule (*Fig. 3*). In only two of our ten cases were characteristic pointed cells found in large numbers. In the others, poikilocytosis was marked and tailed and pointed forms resembling sickled cells could be demonstrated, but these distorted cells did not in number or in specificity of shape differ enough from the tailed and tapering forms seen in other anemias to arouse suspicion. The final diagnosis required the moist preparation to confirm the presence of true sickling. It is probably safe to state that most of the cases of sickle cell anemia recognized in the past have been of the type in which the diagnosis was suggested by the conspicuous morphology of the red blood cells in the stained smear, and that countless cases of sickle cell anemia have been missed or diagnosed hemolytic jaundice, pernicious anemia or von Jaksch's anemia because these obvious sickled forms were not present.

The white blood cell count is characteristically increased, the average leucocyte count being 18,000 per cu. mm. (69 cases). Occasional cases may show low or normal counts, but these are rare. Leucopenia has not been noted. The majority of cases have a leucocytosis well above the normal range (*Fig. 4*). It might be argued that this leucocytosis is not really due to the numerous megaloblasts and nucleated red blood cells which are counted along with the white cells. After correction for this factor, however, leucocytosis is still present.

The differential formula is variable, and not particularly striking. On account of the at times numerous premature erythrocytes, and atypical and pathological cells of all sorts, accurate differentials on these cases often tax the diagnostic acumen of the hematologist.

The average polymorphonuclear count was 59 per cent in 67 cases. However, the distribution of cases according to their neutrophils is by no means uniform (*Fig. 4*). It is usual to find a few myelocytes and meta-myelocytes. A comparison of the distribution of neutrophilic granulocytes in ten normal negroes and in the admitting smears of eight cases of sickle cell ane-

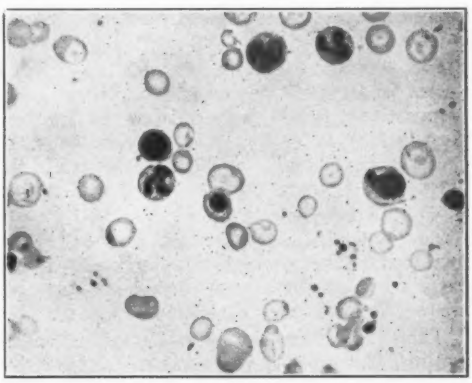

Fig. 3

Fixed smear from an active case of sickle cell anemia. Note the absence of typical sickled cells; slight poikilocytosis; anisocytosis and anisochromia. Three nucleated red blood cells, one intermediary form, one lymphocyte, two segmented polymorphonuclears, and one metamyelocyte are seen. Microphotograph X 750.

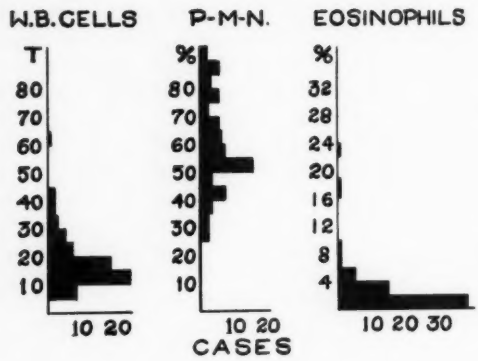

Fig. 4

Chart showing the distribution of cases according to their average leucocyte count; the percentage of neutrophilic leucocytes, and the percentage of eosinophils.

mia (*Fig. 5*) reveals in the anemia cases a "shift to the left." Also a normal or slightly increased percentage of mature segment forms, a dispersion of granulocytes, is shown.

Contrary to the statements often made in the literature, eosinophilia is not a characteristic finding, although high percentages have been noted in individual cases. The average eosinophil percentage for 63 cases was 2.2 (*Fig. 4*). We have noted sharp rises in eosinophils following liver therapy.

No numerical statement can be made as to the average number of lymphocytes and cells of the reticulo-endothelial system, as the terminology used for these elements is not uniform. In many cases the large mononuclears are increased but not consistently.

Phagocytosis of erythrocytes by large mononuclear cells,[4 9 10] frequently observed in moist preparations, is less frequently found in fixed preparations (*Fig. 6*). The demonstration of erythrocytes or masses of hemoglobin within the cytoplasm of these cells is strong evidence in support of the diagnosis.

The platelets occur in normal numbers or are increased. The average platelet count in 17 cases was 369,000 per cu. mm. The platelets are well formed, and often are very large.

The bleeding time is not prolonged; the average in 8 cases being 3.3 minutes. The clotting time is normal; 4.7 minutes being the average in 14 cases. The clot formed is firm and tenacious and retracts well.

The sedimentation rate reported by Graham[50] as increased has not been determined by standard methods frequently enough to justify conclusions. We have failed to note an increased rate of sedimentation in an uncomplicated case of chronic sickle cell anemia, and it is possible that the attendant infections rather than the anemia alone play the predominant part.

The resistance of erythrocytes to hypotonic salt solutions is variable, but usually increased. The averages of 25 active cases revealed an hemolysis beginning at 0.35 per cent NaCl and complete hemolysis at 0.22 per cent. Extremely low figures of 0.00[23] and 0.03[29] are reported. The decreased fragility and the capacity of the

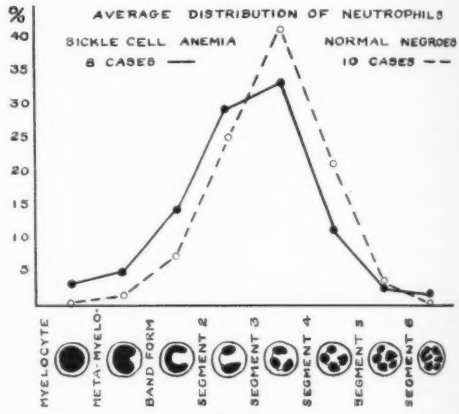

Fig. 5

Chart showing the comparative average distribution of neutrophilic granulocytes in ten normal negroes and in eight cases of sickle cell anemia. Note the "shift to the left" and the dispersion of granulocytes in the anemia cases.

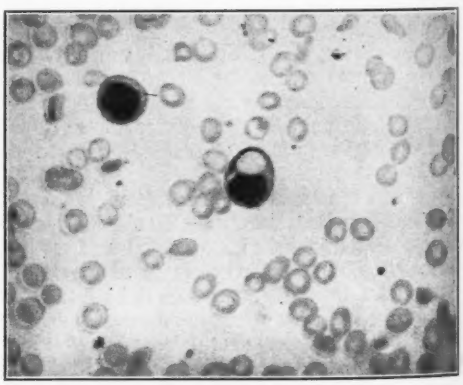

Fig. 6

Fixed smear (Wright's stain) from a case of sickle cell anemia, showing two large mononuclears, one with phagocytized red blood cell. Also notice the absence of typical sickled cells. Microphotograph X 750.

cells to sickle constitute the principal differential points between sickle cell anemia and hemolytic jaundice.

The hemolytic character of the anemia is confirmed by chemical examination of the blood. There is an increase in serum bilirubin (increased icteric index and quantitative van den Bergh). The direct van den Bergh reaction is usually negative and the indirect positive. Urobilin is present in the urine and the stools are dark.

On account of lack of space the discussion of other topics directly related to the blood picture, such as differential diagnosis and the effect of therapy and of splenectomy, are omitted.

CONCLUSION

The blood elements in sickle cell anemia, although subject to wide variations, present during the definitely anemic phases of the disease a diagnostic blood picture. Sickled cells in the fixed smear are rarely specific enough to make the diagnosis on morphology alone. The suspicion is usually aroused by the history and clinical signs, by an anemia associated with jaundice, leucocytosis and premature erythrocytes in the smears. Given such a combination in a negro, the demonstration of the sickle cell phenomenon in the moist preparation clinches the diagnosis. Reticulocyte count, cell volume, fragility test and examination of the family for sickling would be confirmatory procedures indicated. It is predicted that sickle cell anemia will become a common diagnosis when clinicians become sickle cell anemia minded, and in addition to personally studying blood smears, make moist preparations routine in unexplained hemolytic anemias.

SUMMARY

(1) Sixty-four cases of sickle cell anemia reported in the literature and ten cases observed in Memphis are analyzed in regard to the blood picture.

(2) The characteristic features of the blood picture in active sickle cell anemia are:

(a) The presence of sickled cells in moist preparations.

(b) Signs of red blood cell destruction (poikilocytosis, degenerating forms, microcytes, increased serum bilirubin, negative direct van den Bergh and positive indirect; urobilinuria, phagocytosis of erythrocytes by large mononuclears).

(c) Signs of increased regenerative activity on the part of the bone marrow (megaloblasts, intermediary forms, nucleated red blood cells, nuclear fragments of all types, diffuse basophilia, macrocytes, increased reticulocytes, leucocytosis with a shift right and left, increased platelets).

(3) Sickling without anemia, hemolytic anemia without sickling, or secondary anemia in association with the sickle cell trait are to be distinguished from true sickle cell anemia.

(4) Typical sickled cells, although striking and unmistakable in fixed smears and fresh moist preparations from some cases, are the exception rather than the rule.

(5) The average red blood cell in sickle cell anemia is smaller than normal. The cell volume is decreased out of proportion to the decrease in the red blood cell count and hemoglobin. The color index is variable but usually below 1.

(6) The erythrocytes in sickle cell anemia are more resistant to hypotonic salt solutions than normal.*

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*I am indebted for the illustrations of this paper to Mr. Joseph L. Scianni, Artist of the University of Tennessee, Pathological Institute.

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DISCUSSION (*Abstract*)

Dr. V. P. Sydenstricker, Augusta, Ga.—Sickle cell anemia is comparatively rare in many sections of the country, but many instances have doubtless been overlooked. Our requirements for diagnosis are a severe anemia of hemolytic type occurring in a negro showing the "sickling trait" in the blood. Last summer we examined the blood of some 1,800 presumably healthy negro children in the public schools. Of these 5.5 per cent showed the sickling trait, two only had sickle cell anemia. Among children admitted to hospitals and outpatient clinics the number is of course greater.

The literature has been much confused by failure of some observers to note the characteristics of the specific sickle cells. Some have confounded the condition with hemolytic icterus, others have mistaken the "demilunes" of Hayem and Sergeant for sickle cells, still others have mistaken the irregular elongated poikilocytes which occur in normal and anemic blood for the specific cell. Sickle cells have a refractility in fresh preparations and a hyperchromia in stained films that makes them unmistakable to one familiar with their appearance.

The geographical distribution of the condition must be quite variable. In Memphis, in Augusta and in Detroit it is relatively frequently encountered; here (New Orleans) it is rare, and in many other medical centers careful search has failed to bring many cases to light. It has been suggested that the sickling trait may be peculiar to some offshoot of the negro race.

The studies that Dr. Diggs is making on cell volume and hemoglobin saturation in this disease are of the utmost value and will add to our means of identifying the disease.

Dr. Martha A. Wood, Houston, Tex.—We have a pernicious anemia patient who had been treated in all sorts of ways. He was of rather irascible disposition. He went home and decided to do what he wanted to do. He took sugar cane and he improved wonderfully, and is still doing well three years later. The question of vitamins may be involved in this case.

The comparative freedom from sickle cell anemia evidenced in negroes in New Orleans may have some relation to the ease of obtaining sugar cane here.

Dr. Harry C. Schmeisser, Memphis, Tenn.—Dr. Diggs in reviewing the blood picture in sickle cell anemia of 64 recorded cases has done much to correct the confusion which has existed up to the present time. Especially welcome are the findings on the 10 cases from our hospital, 9 of which were studied by Dr. Diggs personally.

The bibliography of this paper, consisting of 50 references, deals mostly with the blood picture in sickle cell anemia and is probably the most complete bibliography to date on this phase of the disease.

Only a few references are found in foreign journals. The prevalence of publications in the American literature is expected when one recalls that the disease was first described by Herrick in 1910 in an American Medical Journal and that with the exception of two cases just cited by Dr. Sydenstricker the disease is apparently confined to the negro race. It is for the same reason a problem of especial interest to the medical profession of the South.

Dr. Diggs intentionally did not include in this paper a discussion of the morbid anatomy, nor did he mention the studies now in progress by Dr. Ching under his direction at our Pathological Institute. Clinical studies have been more frequent than the anatomical. In Dr. Diggs' bibliography are mentioned a necropsy in one case by Sydenstricker, a second by Graham, a third by Hein, McCalla and Thorne, and a fourth by Yater and Mollari. The latent form has been recognized by Rich in cases undiagnosed clinically by the peculiar changes in the spleen which are identical with those of the spleens of the active cases studied in the wards and diagnosed during life. MacCallum is of the opinion that the change in the spleen as described by Rich can be recognized at a glance and is peculiar to this disease.

Boyd, on the other hand, considers the morbid anatomy as indefinite as that of the other anemias.

The charts and diagram, made by Dr. Diggs personally under the supervision of our Artist, Mr. Scianni, and the photomicrographs by the latter, give an excellent visual presentation of the contents of this paper.

In closing, permit me to say that I was very much complimented when the Chairman referred to Dr. Sydenstricker as the world's greatest authority on sickle cell anemia; he was one of my students.

Dr. Diggs (closing).—The relative infrequency of the diagnosis of sickle cell anemia in New Orleans and its possible relationship to a dietary which includes cane sugar, as suggested by Dr. Wood, is of interest. Sickle cell anemia may be a deficiency disease in the sense we now consider pernicious anemia, and cane sugar may possess factors preventing its development. There is no evidence that this is the case. A more probable explanation of the scarcity of recognized cases is that the disease is not considered as a possibility, diagnostic sickled cells are seldom present in the stained smears, and moist preparations are not made. Whenever nucleated red cells and jaundice occur in a negro in association with an anemia, sickle cell anemia is to receive consideration.

CONTACT DERMATITIS AND ECZEMA, WITH REPORT OF NINE CASES*

By HERBERT J. RINKEL, M.D.,†
Oklahoma City, Okla.

Tests for specific sensitization are being employed with increasing frequency in the diagnosis and treatment of dermatitis and eczema. The value of these tests depends upon the method selected in each individual case, the care with which they are performed and the consideration given to the factors other than those of specific sensitivity. Stokes,[1] in a recent article on diabetic eczema, has described in detail the elements concerned other than those of specific sensitization. Briefly, they are pyogen-susceptibility, the predisposing substrate, the seborrheic trend, the neurogenous substrate, and the ichthytotic, as distinguished from the type due to specific sensitization alone. He stresses the fact that it is better from a dermatologic standpoint to speak of the specific sensitization component in all types rather than in an individual type. In this paper we shall consider various problems in determining specific sensitization and report a number of cases for study.

METHODS OF TESTING

In testing patients with skin manifestations of specific sensitization, also referred to as dermatitis or eczema, one may make use of either laboratory or clinical tests. The laboratory tests include the scratch, intradermal, passive transfer and contact (patch) methods. The actual technic of these skin tests is so well known that we shall not discuss it at the present time. Testing often yields negative results in spite of the fact that the patient is truly hypersensitive. Even when an extract of known potency is employed in the scratch method, results are often negative because the material used in testing is not placed in the scratch. Reactions may be overlooked because they are delayed, therefore the tests should be observed closely over a period of at least 4 hours, and should be seen at 12, 24, 48 and possibly 72 hours. Intradermal tests are often condemned because all products give equal or nearly equal reactions. Continued observation will rule out the non-specific reactions, since they have a tendency to fade sooner than the specific reaction. Here again delayed readings are of value since many positive reactions are not manifest until 24, 48 or 72 hours. We shall not discuss the causes of negative reactions beyond our control.

Clinical testing consists of the manipulation of the diet, or the avoidance of contact with a suspected cause of dermatitis or eczema. Both of these procedures may be employed in the same case. Rowe[2] has arranged several elimination diets, which are practical in most cases. Another method is to place the patient on a single food until he is free of eczema, and make additions at five-day intervals. The addition of a single food allows one to determine in part at least its etiologic significance. Another method is to arrange a fairly normal diet on the basis of the diet history, that is, we select a group of foods rarely if ever used in this particular patient's diet and then make additions as described in the preceding method. The manipulation of these diets is not difficult, but it is detailed and requires close cooperation of the patient. We believe with Vaughan[3] that, to save time, the laboratory tests should always constitute the starting point in the treatment of the case. The clinical tests must be used in every case to confirm positive reactors by the laboratory method of testing, except patch, and it is used as a primary means of determining the etiologic factors in those cases that are either negative to laboratory tests or where the skin is hyperirritable and interpretation is difficult. The clinical side of the case must not be neglected for an infinite series of skin tests.

SELECTION OF METHODS FOR TESTING

After a detailed history and a complete physical examination one is prepared to select a method to be used in testing. If the case represents the dermatologic features described by Stokes[1] in his paper on diathetic eczema, namely:

> "Involvement of the elbow, wrist, and knee flexures with the face; dryness and leathery lichenification in intervals between extremely pruritic and often weeping exacerbations and the tendency to a pronounced pale strich reaction ('white dermographism' or 'Nachblassen' of Brill, et al),"

or if the dermatologic features are that of an inflamed and thickened skin with marked lichenification, the scratch and intradermal tests should be used. This latter form was originally described by Brocq,[4] and the value of sensitization tests was emphasized by Wise and Ramirez.[5]

*Read in Section on Dermatology and Syphilology, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

†Associate, Balyeat Hay-Fever and Asthma Clinic, Oklahoma City, Oklahoma.

In both of these forms passive transfer may be employed, if necessary. It is worthy of note that patients presenting either of these manifestations very often have a history of asthma, hay-fever, hives or eczema in the family, or may themselves be subject to sensitization phenomena, such as hay-fever or hives. In contradistinction to this, if the type is that of a superficial eczematous, papular, vesicular, erythematous reaction of dermatitis, then one should use the contact or patch method. We shall show in a number of cases, as Sulzberger[6] and others have shown before, that this type of testing alone will produce findings that are of clinical worth. In our experience this second group of cases has included acute occupational dermatitis, dermatitis venenata, dermatitis medicamentosa, and drug eruptions of the eczematous type, such as arsphenamine or mercury dermatitis. In cases of contact dermatitis passive transfer is not employed because, as Coca[7] has stated, the human skin cannot be passively sensitized with the serum of the sensitive person.

It is possible that when the patient comes for testing the morphological characteristics will be that of the first type rather than that of the second. If we obtain a history of markedly acute exacerbations with vesiculation we should employ the patch test as well as the intradermal and scratch methods. The family histories of the patients in this latter group reveal only a few cases of asthma and hay-fever in the family or the individual, and this is to be expected since the incidence of contact dermatitis does not depend upon an hereditary influence. Coca[7] has shown that approximately 70 per cent of the Caucasian race is subject to this condition.

While this paper considers only the skin in contact dermatitis, it is well to be reminded that contact reactions may occur in the bronchial and gastrointestinal mucosa as well.

INTERPRETATION OF TESTS

A positive reaction, as for instance the occurrence of a wheal with a surrounding area of erythema, which occurs in the scratch and intradermal test, or the reproduction of the original type of dermatitis in the patch test, is generally accepted as indicating a specific sensitization. However, that does not mean that the particular antigen used in testing is necessarily the etiologic factor of the original skin eruption. Thus we must interpret positive reactions with reservations. In contact dermatitis the substance used in testing must not be a primary irritant, and in addition there should be a history of possible contact with this particular substance. The test should reproduce the same type of dermatitis as was originally presented by the patient. On removal of the offending substance the dermatitis should heal, although in some cases this process is very slow and may consume many weeks.

In eczema the positive reactions obtained by scratch and intradermal tests must likewise be made by substances used in the diet or identified in the environment. The eczema should heal on the elimination of these reactors. Obviously, since these cases do not give a positive reaction by the contact type of testing, it is impossible to reproduce the type of eczema.

In contact dermatitis and eczema our rules are subject to further interpretation. In the first place, it must be remembered that a patch test is an abnormal type of contact existing over a relatively short period of time, and therefore a truly etiologic substance may fail to give a reaction. In the second place, the statement that a contact dermatitis or an eczema should subside on the removal of the offending product is not always a matter of clinical observation. By way of illustrating this point we shall report an eczema resulting from the testing with shell sea food extracts, which failed to clear in five weeks' time on thorough elimination of the same specific sea shell foods. This case yielded to treatment after all reactors were removed. There are many cases of eczema that do not entirely heal when all reactors are removed. On putting these foods back into the diet one is able to produce an exacerbation of the eczema. Two things may explain this failure to heal. First, and more important, there is a constitutional background as a basis for the eczema; and second, and less important, there are multiple sensitizations. In contact dermatitis removal of all of the offending factors is more apt to be followed by clinical cure.

CASE REPORTS

In reporting cases we wish to use only those that demonstrate some particular problem in the diagnosis of specific sensitization. The cases presented have all been seen by competent dermatologists not only locally but in other medical centers. Mention is made of this fact because a case should be studied from every angle and not from the standpoint of specific sensitization alone.

CONTACT DERMATITIS DUE TO HELENIUM MICROCEPHALUM D. C.

The only references that we have been able to obtain concerning the *Helenium* family are those of Weber,[8] who lists *Helenium autumnale* in his report of cutaneous irritants, and in Andrews'[9] book, "Diseases of the Skin." In the latter reference, mention is made of the fact that systemic reactions often follow skin contact. We have found *Helenium microcephalum* D. C. to be a common cause of contact dermatitis in our region. Because of the distribution and abundance of the plant and the severe dermatitis produced by contact, we believe it is a much more important factor than is generally conceded and we are therefore presenting two cases.

Case 1.—J. W. S., age 54, a male, was seen July 16, 1931, with a complaint of itching and burning of the skin of 3 years' duration, continuing from middle June until late August. His mother was subject to sick headaches. On examination we found a marked erythematous papulovesicular eruption limited to the upper and lower extremities and the face and neck, being more marked on the flexor surfaces.

The results of testing were as follows: foods, animal dander, and pollen by scratch and intradermal technic were negative. A patch test was made with a leaf and ether solub'e extract of *Helenium microcephalum* D. C. The marked positive reaction at the end of 4 hours is illustrated with the Agfa color plate on the screen. Twenty-four hours after the patch was applied the patient developed a marked conjunctivitis, abdominal cramps, diarrhea, and a slight headache. The urine was albumin free. An extract of the dried plant, made by Coca's method, was injected intradermally in a 1:1000 dilution. It failed to react. A 1:50 dilution of the same extract was negative by scratch test. A patch test made with this same material produced a mild positive reaction. A watch crystal test for volatile oil was negative. Chemical fractions are being prepared by Dr. Mark Everett, of the University of Oklahoma Medical School. The work is incomplete at the present writing, but it appears that the absolute alcohol fraction and the water soluble fraction are the most toxic. In our testing we used the ether soluble fraction, which is less toxic than either the absolute alcohol or water soluble extracts.

Passive transfer was made with the following technic: ten c. c. of blood were drawn into a dry sterile syringe, defibrinated and centrifuged. The clear serum was pipetted off and run through a Seitz filter. It was cultured, found sterile, and 0.05 c. c. of this sterile serum was injected intradermally in the skin of another individual. At the end of 24 hours a patch test was made with the ether soluble extract of *Helenium microcephalum* D. C. A control was made by running a patch test on the non-sensitized skin. Results of both tests were negative.

COMMENT

This patient presents a typical case of contact dermatitis, the important features of which

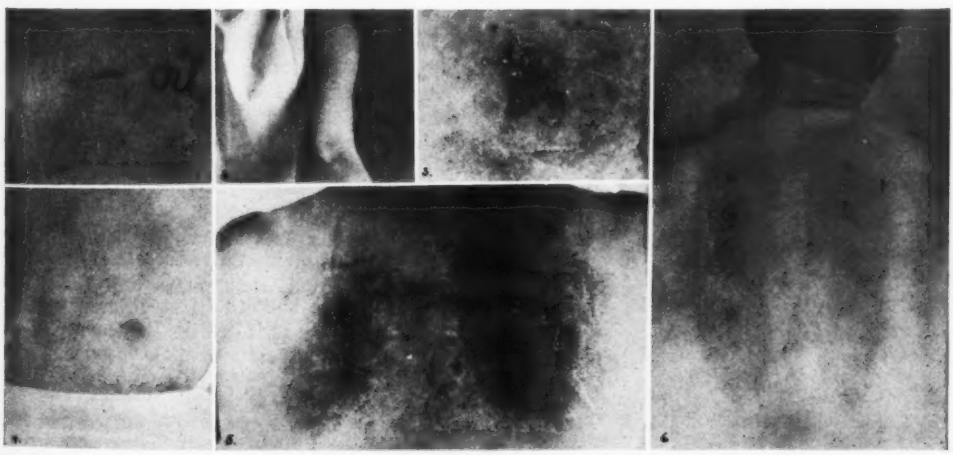

Fig. 1

Composite photograph illustrating results of testing in contact dermatitis due to *Helenium microcephalum* D. C.

(1) Negative scratch test with ether soluble extract of the plant.
(2) Negative intradermal test with Coca's extract of plant.
(3) Patch test with water soluble extract of plant.
(4) Control patch test with ether soluble extract in non-sensitive individual.
(5) Illustrating patch test. Control is negative to the left; the powdered leaf produces a moderate reaction in the center, and the ether soluble extract produces a marked reaction on the extreme right.
(6) Results of patch tests with chemical fractions. From top to bottom in left row are seen: The patch test made with ether soluble fraction, the water soluble fraction, and the absolute alcohol fraction. The other tests are from unpurified fractions and have no significance.

are: the marked erythematous, papular, vesicular eruption; the failure to give positive reactions by the intradermal or scratch methods of testing; the production of the original type of dermatitis with contact testing; the associated systemic reaction; and a positive patch reaction with the solution which failed to react by intradermal and scratch testing. The patient was seen intermittently until September, 1931. In spite of the fact that he had gone into a territory that was practically free of *Helenium microcephalum* D. C. and had no possible contact with the plant after July 16, there was still marked itching and burning in the involved areas. From a practical standpoint this illustrates the fallacy in applying rigidly the rule given under "Interpretation of Tests," that the elimination of the offending product produces clinical cure.

Case 2.—M. R. M., age 45, farmer, was seen July 3, 1931, because of a marked itching eruption of four summers' duration. He also had been subject to hives for 7 years and hay-fever the past year. His mother had hay-fever. Examination showed an eruption generalized over the extremities, face and neck. The character of the lesions was the same as described in the previous case except that there was marked inflammatory edema and swelling of the legs and feet.

Eighteen foods gave a positive reaction by the scratch or intradermal method, and there was a moderate reaction to giant, short and western ragweed (*Ambrosia trifida, Ambrosia elatior* and *Ambrosia psilostachya*). Patch tests made after a survey of his home showed positive reactions in the case of cocklebur (*Xanthium canadense*), western ragweed (*Ambrosia psilostachya*), *Helenium microcephalum* D. C., bull nettle (*Solanum carolinense*), sunflower (*Helianthus annus*), and hydrangea (*Hydrangea aborescens*).

COMMENT

We considered the *Helenium microcephalum* D. C. to be the prime factor because, first, it was the only reactor to reproduce the original type of dermatitis, with erythema, induration, and a papulovesicular eruption. Second, because a survey of his home surroundings showed *Helenium microcephalum* D. C. to be very prevalent. Third, the onset of his symptoms corresponded with the onset of proven cases of *Helenium* sensitivity.

Of interest here are the occurrence of food and other reactions by the intradermal and scratch methods. Did they play a role in the clinical course of his contact dermatitis? We must remember that there is a specificity among these positive reactors. Thus the patient may be sensitive to 6 or 8 foods and 2 of these foods will cause marked pruritis, one will cause diarrhea, one may cause a sick headache, and another may bring on an attack of asthma. Therefore clinical testing determines the importance of these reactors. In this patient, the foods that have a tendency to cause pruritis would be of importance. The occurrence of hives and hay-fever in the patient accounts for the intradermal and scratch tests being positive. The incidence of hay-fever in the family is considered of no diagnostic significance since the occurrence of contact dermatitis is not influenced by heredity.

CONTACT DERMATITIS DUE TO LETTUCE

Case 3.—Mrs. R. L. T., age 38, a salad maker, was seen in 1925 with an eruption involving the hands and face. Examination showed the affected area to be markedly erythematous with a few scattered papules and vesicles. A number of the vesicles had ruptured and coalesced to form weeping and denuded areas. At that time the intradermal and scratch tests were negative, but a positive patch test was obtained with lettuce. Avoidance of contact brought clinical cure.

The patient was seen in 1930, at which time the patch test with lettuce was negative, but the intradermal test was positive. At that time we obtained the history that the dermatitis recurred following either the handling or the eating of lettuce. There were no gastrointestinal symptoms on ingestion of lettuce. Handling lettuce produced a lesion only on the hands and the adjacent parts. At this time repeated patch tests were negative.

COMMENT

The following points are to be noted. First, the ingestion of and the contact with lettuce both produced a similar lesion. As pointed out by Sulzberger,[6] the clinical picture of a hypersensitive skin depends on the localization of the specific hypersensitiveness. Therefore, as illustrated in this case, one may have a contact either by eating the food or by handling it. Second, the patient's skin had lost its ability to respond to a patch test after there had been strict avoidance of lettuce for 5 years, but continued to react if she handled lettuce over any period of time. This illustrates the inadequacy of the patch test in determining etiologic factors.

PATCH TESTS IN ECZEMA

Case 4.—Miss B. D. G., age 24, was seen September 28, 1931, because of asthma, hives and a scaly eruption since childhood. There was a history of exacerbations of the eczema with weeping.

On examination we found the eruption was limited to the upper extremities, face, neck, and on the trunk down to the waist line. The affected area was moderately erythematous, with a marked papular eruption, and in places these papules had coalesced to form circumscribed plaques of eczema. These plaques occurred chiefly in the cubital and axillary fossae. There

were marked excoriations due to the itching and rubbing.

There were many positive foods by the scratch method and by the intradermal method. Patch tests made with silk and flaxseed were positive at 48 hours. In order to determine the possible variation of skin reactivity on different parts of the body orris root and silk were run by the scratch method and wheat, eggs and milk by intradermal technic with results as follows:

	Orris Root	Silk	Wheat	Egg	Milk
Calf of leg	0	++++	+ss	0	+
Upper thigh	0	++++	0	+ss	++
Lower thigh	0	++++	0	++	++
Right arm	0	++++	0	+ss	++
Left arm	0	++++	0	+ss	+
Back	0	++++	0	+	++

COMMENT

This case illustrates the occurrence of a positive patch test in an eczema subject to acute exacerbations. Sulzberger[6] has stated that contact tests are apt to be positive only with acute or subacute erythematous, papular and vesicular eruptions. He has also brought out the point that positive patch tests may be obtained where one elicits by the history the occurrence of this acute type of eruption. The findings in this case support that contention. We have been patch-testing all cases of eczema and contact dermatitis for the past two years. With few exceptions we have obtained positive patch tests only in cases of contact dermatitis, and in eczemas in the acute or subacute stage. Can we explain the limitation of this patient's eczema by a variation of skin sensitivity in different regions of the body? The results of testing with silk, wheat, eggs and milk do not support such a hypothesis. The patient had practically cleared up in two weeks' time, thus indicating that these reactors were of etiologic importance. As to the food reactions, we remind you again of the specificity of reactors. The egg and the milk reactions may be of importance in either her asthma or urticaria, and not in the eczema.

DERMATITIS DUE TO ORRIS ROOT

Case 5.—Miss M. M., age 26, seen June 10, 1931. Examination revealed a reddish brown discoloration with a few dry scales limited to the upper and lower eyelids. There was a moderate amount of edema and infiltration.

Intradermal and scratch tests were negative. A patch test with orris root was questionable at 48 hours and at 108 hours was definitely positive, producing a reddish brown lesion with slight scaling. These findings coincided with previous findings by a dermatologist who referred her to us because he felt that there was a possibility of foods as a secondary factor in her eczema. These reactors being negative, we assumed that orris root was the sole cause of her eczema. Desensitization with orris root extract, together with complete elimination of cosmetics containing orris root, produced clinical cure.

COMMENT

Coca[7] states that desensitization has not yet been accomplished in contact dermatitis. Since clinical cure was established with repeated injections of orris root extract, the question arises: was desensitization or avoidance of contact the cause of the cure? Up to the time we saw her there had been orris root elimination, but not desensitization. We prescribed desensitization because we felt that elimination could not be complete.

In explaining the pathogenesis of her dermatitis we should not overlook the possibility of a cutaneous reaction produced by the implantation of orris root in the minute excoriations and fissures, produced by rubbing in an attempt to relieve pruritis. Desensitization tends to relieve the pruritis. Without trauma from rubbing and scratching, orris root falling on the sensitized eyelids would not have an opportunity to cause a reaction. This may explain our good results. Refuting this contention is the fact that we were able to obtain a positive patch test with orris root and that this test reproduced the original symptoms, namely, an eruption of the same type and color, plus pruritis.

ECZEMA DUE TO CONTACT WITH FOOD

Case 6.—S. A. S., age 4 months, was seen on May 24, 1930, with infantile eczema of 2½ months' dura-

Fig. 2
Milk reaction in a case of infantile eczema, in which contact with milk produced eczema.

tion. The family history was positive for allergic manifestations. The patient was found to be markedly sensitive to eggs and milk by the scratch method of testing. Removal of these foods brought clinical cure. On one occasion the mother accidentally spilled milk on the baby's face and upper chest, and within a few minutes' time this area was covered with a bright red eruption, rather uniform, with sharply demarcated borders. This eruption subsided after several weeks, with scaling.

COMMENT

The point illustrated here is not new by any means, but it indicates that we are justified in testing various foods with the patch method in cases of acute or subacute infantile eczema. We have seen milk produce a marked dermatitis within five minutes after it was placed on an apparently normal skin. This phenomenon occurred in a child who was sensitive to so many foods that he was kept on the breast until he was 3½ years of age. In treating infantile eczema it may be wise to remove entirely the offending food or foods from the home. We have found removal of foods of value chiefly in egg-sensitive individuals.

CONTACT DERMATITIS DUE TO RAGWEED AND FEATHERS

Case 7.—Mr. M. E., age 57, seen October 15, 1931, with a complaint of a skin eruption of 17 years' duration. His son is said to be subject to the same type of difficulty. This eruption cleared whenever he went to Baltimore, Rochester, Minnesota, or Boston, or if he remained within the city limits of his home town.

Examination revealed an eruption rather generalized over the body, the only free areas being the back and the extensor surfaces of either arm, the neck, and the upper half of the anterior chest wall. The affected areas were slightly erythematous with a large number of discrete papules. In many places these had coalesced to form plaques, chiefly in the cubital, popliteal and axillary fossae and in the folds of the skin of the anterior abdominal wall. In these latter areas there was considerable thickening of the skin with a moderate amount of lichenification. The skin was quite dry and leathery to touch. The area protected by the hat band was free of the eruption. There was a history of definite vesiculation in the past.

Pollen and animal dander tests were negative. All food tests were negative.

We decided, because of the history, that the cause of his difficulty was some local plant, and after a survey of his home environment patch tests were made with short ragweed (*Ambrosia elatior*). sunflower (*Helianthus annus*), *Helenium microcephalum*, and three feathers. In 24 hours a patch test made with the oil extracted from ragweed pollen and one with the leaf of short ragweed (*Ambrosia elatior*), and with the protein extract of duck, goose and chicken feathers, had produced a deeply indurated, sharply demarcated patch of dermatitis with vesiculation. The tests were well controlled. We produced marked exacerbation of his dermatitis by testing and by injection of whole ragweed pollen extract.

COMMENT

There are two features about this case worthy of consideration. A few years ago it would have been quite proper to assume that the benefit derived from going to Baltimore or Boston was due to a change in the climate, without any thought that there might be a specific factor in the case. The second point that we wish to stress is the fact that patch tests may be of diagnostic value in cases that have the appearance of chronic eczema. In this individual there was a moderate lichenification and dryness of the skin, and the leatheriness suggested an eczema rather than a contact dermatitis, but the history of his acute exacerbations and of vesiculation indicated the need for patch testing. We formerly felt that eczema that existed only through the hot weather probably was due to the effect of temperature and exposure to sunlight. From experience in the past two years we have learned to stress contact with plants and to think less of specific sensitivity to thermal and physical agents.

NON-ALLERGIC FACTORS IN ECZEMA

Case 8.—J. B. T., age 55, a machinist, was seen August 29, 1931, because of a skin eruption of 13 years' duration. In addition, he was subject to asthma and occasionally had migraine headaches. Examination revealed a papular eruption in a non-erythematous base. On the anterior abdominal wall, the cubital and popliteal fossae and in the axillary folds these papules had coalesced to form plaques of eczema. There was considerable thickening of the skin of the forearm and cubital fossae with marked lichenification.

There were a large number of positive reactors by scratch and intradermal tests. Wheat, eggs and milk in particular gave marked intradermal reactions. Patch tests with various weeds, silk, wool and machine oil were negative. Elimination of wheat, eggs and milk and a number of the other important foods as determined by testing, produced a marked exacerbation of symptoms within a few days. The patient was then placed on a wheat, egg and milk diet, and immediately the condition cleared up. This occurred while he was staying away from home. On his return home he quarreled with his wife and the next morning his eczema was as bad as before he started treatment. He then returned to us, and the eczema cleared up again. We then began to add various foods to his diet and have been able to prove that pork, potatoes, corn, beef and sweet potatoes would cause an exacerbation of the eruption.

COMMENT

One who reads all positive reactions as positive factors will get in difficulty for the simple

reason that the occurrence of a positive reaction does not prove clinical relationship. We must not overlook elements other than those of specific sensitization in the dermatologic cases actually hypersensitive. The neurogenous background or the eczema personality is the element well illustrated in the flare-ups observed in this patient after a family quarrel. Furthermore, we were able to elicit the occurrence of many such exacerbations due to mental upsets, family disagreements, the loss of money in gambling, and so on. Here also is illustrated the futility of running tests, and determining the important reactors by laboratory tests. The diagnosis of specific sensitization begins as a laboratory procedure and is completed by environmental study and clinical manipulation.

AIR-BORNE PROTEINS IN ECZEMA

Case 9.—Mrs. W. O. R., age 56, was seen January 6, 1930, because of an eczema occurring on both lower and upper extremities, chiefly on the flexor surfaces, and also on the face, neck and back. Examination showed that the affected skin was slightly erythematous with a few scattered papules. There was a moderate amount of thickening of the skin and lichenification in the cubital and popliteal fossae. There were a few plaques of eczema on the back and legs. The patient complained of marked pruritis.

Wheat gave a positive reaction by scratch and intradermal tests. Wheat and its products were taken out of the diet and the patient returned home. When seen 2 weeks later there had been no improvement. We instructed her at that time to keep out of the kitchen whenever flour was being handled. She was also warned not to wash dishes, in order to avoid contact with wheat. Within 2 weeks her condition cleared up entirely and she remained free of all symptoms for over 8 months.

COMMENT

This patient's improvement after elimination of wheat and avoidance of contact with flour, that is, through particles in the air, is explained on the following basis. The flour dust coming in contact with abrasions and exacerbations produced by scratching results in numerous and repeated cutaneous reactions not unlike those produced by scratch laboratory tests. In all cases of possible contact dermatitis the probability of this mechanism should not be overlooked.

CONCLUSIONS

(1) Testing for specific sensitization is of value when properly employed, namely, patch testing in cases of contact dermatitis, and scratch and intradermal testing for the diathetic or neurodermic types of eczema.

(2) Patch tests are sometimes of value in infantile eczema where there is a tendency to marked exacerbation with weeping.

(3) The etiologic importance of *Helenium microcephalum* D. C. has been stressed. Our botanical survey and the results of testing indicate it to be of great importance at least in our territory.

(4) Contact dermatitis may be the result of ingestion or external contact.

(5) Desensitization may be necessary in dermatitis due to orris root.

(6) Eczema due to specific sensitization may be limited to certain portions of the body, but the reactions to these specific proteins appear in our case to be the same in different localities.

(7) The possibility of producing an eczema by introducing an antigen into the skin by way of minute excoriations is brought to your attention.

(8) There are many factors other than specific sensitization which must be considered in the diagnosis and treatment of eczema and dermatitis. While due recognition must be given these elements, one should continue to search for the specific etiologic factor.

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DISCUSSION (*Abstract*)

Dr. M. F. Engman, Jr., St. Louis, Mo.—Dr. Rinkel has given us beautiful examples of colored photography and how they may be used to depict many dermatological conditions, including contact tests. In cases of hypersensitivity, to demonstrate the offending agent, it is necessary, as Dr. Rinkel has shown, to correlate the history, the laboratory tests, and the results of eliminating probable offending factors.

It is important to bring out the difference between

contact dermatitis and allergic eruptions. We have used the word allergy so loosely that I, for one, do not always understand what is meant by it. On one occasion it may mean an increased reaction of the skin either to an organism, a toxin, or an irritant, and at another time it may imply a specific sensitivity of one kind or another. Coca has clarified our viewpoint considerably by observing certain fundamental differences between allergy, or atopy as he expresses it, and con tact dermatitis. He shows, first, that only 7 per cent of the population are atopic, while 70 per cent seem to be capable of developing contact dermatitis. He believes atopy to be an inherited characteristic, whereas contact dermatitis does not depend on any special predisposition. Secondly, by passive transfer of sensitivity he is able to show reagin in the blood of atopic individuals, but is unable to demonstrate them in cases of contact dermatitis. Thirdly, in a recent paper, Brown, Milford and Coca show that in cases of contact dermatitis due to a pollen the offending agent is present in the pollen oil, whereas in atopic cases the offender is a protein antigen.

Engman, Sr., has believed for many years that the fundamental lesion in food eczema or allergy is a pruritus. The offending agent or antigen is brought to the skin by the blood stream. At points of increased local capillary permeability there is an effect upon the cells of the skin capillaries and the tissue cells in the immediate environment of the capillaries. This effect brings about a further increase in local capillary permeability. According to Petersen, there is at such a time a general resulting increase of capillary permeability. The patient feels a more or less generalized itching and at once traumatizes the skin by scratching and by chemicals. A certain amount of secondary infection adds to the picture and we have what we call eczema. Long continued traumatization in one area may cause lichenification. We have, therefore, in eczema an underlying fundamental pruritus with a superimposed dermatitis due to trauma of various kinds.

Contact dermatitis may present a similar picture from trauma, but the lesion is different. Here the fundamental lesion is an edema in the epithelium or vesicle. It is due to direct effect upon the epithelial cells by an irritant. This irritant is usually specific. As mentioned before in connection with the pollen dermatitis, it is found in the pollen oil. This may account for the location of the dermatitis on the face, flexors of the elbows and knees and the axillae, which are areas somewhat more oily than others. Traumatization may be superimposed upon this dermatitis before we see the case and as a result we may have generalized eczema with itching which is not due to either an allergic antigen or a contact agent. Diagnosis in many of these cases is, therefore, often quite difficult.

Dr. Andrew L. Glaze, Birmingham, Ala.—The abnormal sensitiveness of the skin to insult, which, in so-called eczematous individuals we recognize as an inheritable trait, is the real factor, the real mystery behind eczematous dermatitis. Sabouraud of France has repeatedly called attention to this underlying biological fundamental. *Sans mots Grecs,* as he says, explain to me why one washerwoman and her daughter will develop eczema from continuous use of hot soapy water, while the woman working beside her and the daughter of the woman working beside her will not. Explain that to me, and you will find that the other seeming difficulties which are associated will explain themselves.

PERSONALITY PATHOLOGY*

By STEWART R. ROBERTS, M.D.,
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On November 11, 1931, three new patients came to the office for help. The first was a large, red-faced, full blooded man who operated a filling station, spent most of his working hours out of doors, and confessed himself an enormous eater. On July 1 he had turned blind, staggered to bed, vomited and the whole world seemed to turn for several days unless he lay quietly on his back. With appropriate examinations and tests the evidence pointed to a hemorrhage into the left labyrinth with a resulting exaggerated Meniere's syndrome. The fact that he was gradually improving afforded proof of a favorable outcome. The affair was explained to him; he was cautioned to reduce his food, take more exercise and lose flesh. No medicine seemed necessary. A report was made to his physician, and he departed with apparent relief and appreciation. He stated that his anxiety and apprehension about himself had caused him to seek a full explanation of his case.

The second was an effeminate, pale, indoor boy who, though 24, looked 20. His eyes were blue, his hair light brown, his fingers long and tapering, his skin soft, with a wistful face as of one fearsome and yet struggling against his fear. He seemed to me at first some half-hearted artist boy, uncertain because he had never found himself. His family history was uninteresting except that his father died of pneumonia at 43, and he was one of five boys and four girls. He had in hand the usual large envelope generously filled with x-ray films, which he cast down on my desk rather contemptuously. His complaint was of stomach trouble beginning April 1, 1931. Then he became constipated. He sleeps from 10:00 to 7:00; "pushes a bookkeeping machine" in the unimaginative, routine work of a large corporation from 8:30 to 5:00 with 30 minutes for lunch. He enjoys walking to work, his church on Sundays, and his two men friends. He would do boy scout work, but his job forbids time off. He is not interested in girls. He is tired in the evening, caused, he thinks, from sitting cramped and bent forward during the day. He has a distended abdomen and belches, particularly when he lies down at night. He passes much gas by rectum. There is often a dull aching feeling midway between umbilicus and pubis and in the small of his back, both worse in the evening. He resents the way he has been treated by his former physician. He had taken medicine for 7 months and 10 days without improvement. Two series of x-rays had been taken, the first of the alimentary tract and the second recently of the gall-bladder. What roused his youthful impatience was that the treatment had been expensive and now an operation for the removal of the gall-bladder was recommended, though he had "never felt any pain where the gall-bladder is." He had been told that his gall-bladder did not empty promptly after a fat meal that he did not like anyhow. He had much other laboratory work done. He could not afford to spend so much money,

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and all this time he had been taking medicine and now they wanted to operate.

It was an appealing story. He was really honest. His physician had evidently done his best, but had never touched the boy's personality. I asked if that was all he had to say. He said "yes," and again "yes." It was certainly a good story of gas, aching, belching, being tired and being disgusted with medicine, only nothing about himself—the boy within, the personality under cover of physical complaint. He had been describing his discomforts at the physical level, but what of his life? Why should a youngster of 24 have gas and why should constipation suddenly begin last April? "Now, let us talk about you and see if anything that you have been through has had any influence on your condition. What happened to you in 1930?" He answered: "My little 17-year-old brother was sick three times in the hospital. He is very near to me. The last time his automobile turned over on him the Sunday after Christmas and he was unconscious four weeks. Every time the 'phone rang I thought he was dead. I do not see how mother stood it. Then in March, 1931, I went in swimming in very cold water and had a chill and a cold and my eyes swelled and I was out of work ten days. Then the last of March the bank in which I had my little savings failed and took with it all the money of the other members of my family. I graduated at ..... College, went into the gasoline filling station work, and lost my job there and lost another job as a salesman. I think my trouble is that my mother decided everything for me all my life until after I left college, and then things have been coming too fast. I have always wanted to be an interior decorator and have a nursery. I have never had any work that I was interested in or that I was suited to do. I hate my present job. I have been a machine for three years. I do it to live." It is week in and week out at his machine. Why did he not tell his previous physician? He was not asked was the excuse. "They just kept testing me."

His pulse was regular, ranging from 50 to 60 on different days. His tonsils suggested a mild infection without systemic symptoms. The barium had gone through in 24 hours. There was no tenderness in the abdomen. The descending colon was contracted and slightly stringy, rather spastic than intimating colitis. All other x-ray and laboratory examinations were normal. With abundant and cheerful explanation and psychotherapy, and the advice that he begin work on Saturdays, an open day with him, in a florist shop and study his decorative art, that he cultivate six men friends and six girl friends, continue his church work, and forget the inhibiting influence of his mother, he improved rapidly. I heard no more of any pains. No medicine was used. His pulse gradually rose to 72. He was asked to write me an outline of his personal life, which he did gladly, seemed interested and greatly relieved. I thought him cured. Had I not been a doctor or had a doctor's advice, I could not have helped him; though I could have been a doctor and not helped him. He was a psycho-physical problem, a totality, a personality.

The third was a tearful little woman of 25, weight 87½ pounds, height 5 feet 1½ inches, married 6 months. Her husband worked at night and she in the day. He is quiet and controlled and she is nervous and fearful. For nine years she has vomited at intervals, has been more nervous for three months, and a poor sleeper for two months. When she was 16 her father became restless, was in constant movement, and finally went to the asylum for the insane for a period. He is now demented and is cared for by his two sisters at their home. For years she helped to look after him, and now she visits him on week-ends, against the advice of her husband. He notices that after seeing her father she is more nervous, has more gas, and is more sleepless. Worst of all, after these visits there is so much gas and distention of the stomach, a rapid and conscious heart action, that she uses her index finger to vomit. It gives sure and temporary relief, but the gas attacks seem to be increasing and her appetite decreasing. She can sometimes vomit freely after seeing her father. But now fears begin to crowd her mind and matters are much worse. She therefore cries more and is more sleepless. Her husband is very good to her, yet she fears she will lose him. She realizes that this is a foolish fear. Then she fears she will have the same mental affliction her father has. If she keeps getting worse and losing flesh, she will be unable to go and will lose her place in the bank. There will then be no one to support her mother and two little brothers except her husband, and that will not be fair to him. So now she fears, worries, refuses to eat a good meal because of gas and loss of appetite, cries and gets worse. She has been taking much medicine, but it does no good and she grows worse. There must be something the matter with her body somewhere for her to feel so bad, though she realizes she is practically starving herself.

She was a sad, bright-eyed, tearful little woman who had been pushed into the troubles and burdens of life far ahead of her years. She had had nine years of it. Her tonsils appeared 2 plus infected. There was a mild pyloric spasm with 1 plus epigastric tenderness and distention. She was a tired little girl, chiefly bones and energy, with nervous indigestion, malnutrition, and an exaggerated emotional background. Even her hemoglobin was 85 per cent. All other examinations and tests were normal. After a full explanation of the whole problem, with emphasis upon the fact that her duties to her father had been met, but now her obligation was to her husband first—then her mother and two little brothers, and the best way to do her duty is to get well and be happy. Only in this way could she hold her position. She certainly could not go on this way. She could get well at home and go on with her work. The following directions were given:

(1) Eat large generous meals, slowly, while you are laughing.

(2) At 8:00 p. m. take a large glass of milk with 1 tablespoonful of cream and go to bed.

(3) Take a glass of milk at 10:00 a. m., lunch, 4:00 p. m., supper and bedtime.

(4) When you get home on Saturday, go to bed and stay there until Monday morning.

(5) Keep your finger out of your mouth. It is for writing and handling things, and not for vomiting.

(6) Get up in the morning as late as possible.

(7) Take one tablet at 4:00 p. m. and at 8:00 p. m. (pheno-barbital, gr. ½).

All explanation, encouragement and directions were done with her husband present. He was appointed "assistant doctor." Some wit and pleasantries were used. She wondered with smiles and blushes if she followed

directions and got well could she have a baby. She was assured she could. With the psychopathic history of her father, evidently with the strain of her life, she was more easily a victim of "nerves" or "nervosity" than with a better history. She returned a week after directions were given with a gain of five pounds, very happy, father at last out of her mind, and wondering why she had not seen the situation instead of having to have a doctor see and explain it all.

These three cases are strangely instructive. The first is a plain case involving an organ of special sense and subject to diagnosis within the well known limits of neurology, though the man confessed a degree of anxiety and apprehension about his syndrome which made him come for an explanatory diagnosis. The second and third are problems of the personality, both of whom had been treated with medicines along the usual lines demanded by the organ or system to which the symptoms were referred. So determined were these patients to get relief that they sought another physician, and if finally they had not been afforded relief, certainly some ingratitude, if not repugnance, toward medicine and doctors in general would naturally have developed. The longer recovery was delayed, probably the greater the train of symptoms and the more difficult the cure.

After some experience in practice, every internist and general practitioner of an observing nature is forced to agree with the psychiatrist and the psychologist that instead of dealing with diseases he is dealing with personalities which have diseases of the body, and other personalities which complain and yet have no structural disease at whose door their complaints may be laid. Circumstances force him to realize in his study of his cases that there is truly a clinical psychology which is ever present and not measurable by any instrument of precision. He may well say to himself that there are more things in medicine than he ever dreamed of in school or hospital. He realizes, too, that there has developed a great new psychology which he is not fitted to pursue except at much effort of time and mind. He seems to be out of touch with two classes of psychologists he would like very much to be associated with. One of these is the academic psychologist who teaches in the university and lectures on the normal mind with rare random excursions into the ways of the abnormal mind, nowadays called abnormal psychology,[1] medical psychology or pathologic psychology. On the other hand, he is largely out of touch with the practitioners who deal with the abnormal mind, namely; the psychiatrist. The segment of his busy circle rarely touches either of these two workers, each a complement to the other and each incomplete in himself, and he needs the points of view each one represents. He sees every day examples of the neuroses and of poor adaptation to life which are triply difficult to understand, to manage, and to cure. He realizes that the former persuasive conception of neurasthenia as a physical problem of exhaustion, curable by isolation, rest and more fat and blood, is no longer tenable or capable of solving the problems presented. And then, even if it were, few of his patients could afford the time and expense necessary.

So many of his patients come complaining of being "nervous," the attempted intimation of a condition difficult to describe. A patient says he is nervous and actually does feel unpleasantly conscious of himself or some particular part of himself. To the popular mind, to be nervous is to be jumpy, jerky, excitable, externally and objectively unstable emotionally and muscularly, but the clinician thinks of nervousness in a much larger way. To him, nervousness involves less the voluntary muscles and more the smooth muscles, less the central nervous system and more the sympathetic and the larger vagus, the organs controlled by these latter nerves, their consciousness, dysfunction, and the attendant and resulting fear, emotional stress and general apprehension; the general impression of the whole mind sick without mental disease, the whole body sick without tissue disease. Organs hitherto unknown and unnoticed merge into the consciousness like icebergs suddenly before a ship on a dark night, as illustrated by heart, breathing, stomach or intestinal discomfort and consciousness. We say the nervous woman has hyperacussis, hearing noises others hear not or pass unnoticed down the stream of consciousness, but to the woman every noise is an event, every sound in the still night a pain. Here, indeed, are the central and the sympathetic nerves, all the nerves, the whole body, life itself. The woman is nervous with an atrocious concentration on noises which are the price of pain. Of course she has insomnia, leans to sedatives, dreads the night, becomes more tense. Just a body doctor would be tempted to exclaim, "What a woman!" The nerves are so sensitized that they ring an alarm bell in the consciousness at what should be easy and tender function. Such nerves tell the personality unpleasant things that stable nerves never think of telling. The eighth nerve alone will not explain such phe-

nomena. The understanding physician will explore the personality, the heredity, the habits, the environment, everything that explains and would change the patient to normal hearing and stable living.

Unfortunately the clinician may be under the influence of strong scientific traditions, for science unconsciously may have traditions and yet call itself science; traditions that have been handed down from philosophy and metaphysics through the old nerve and muscle psychophysiology of the latter half of the Nineteenth Century. The clinician finds himself very often shy of psychology and forgetful of physiology. Of psychology as such, he knows very little. If he is observant and sympathetic with human nature, he develops a tact and understanding remarkably based on true psychology just as a natural orator, even without training in rhetoric or elocution may deliver a real oration. He fears someone may raise the old question of whether the mind can affect the body, the soul, the personality; disturbed emotion cause disturbed digestion, worry cause hypertension, fear cause insomnia, tears and anxiety cause tachycardia with heart consciousness. The researches of Cannon,[2] Pavlor[3] and others have answered these problems in the affirmative and the experiences of the Great War amply confirm them. Every day the clinician sees such evidence and proof in his daily dealings with his patients. Rather the whole question finds its solution in the light of a truer knowledge of the human organism. The mind is not an entity and is very far from being the independent entity that the question assumes. There is no separation of the mind of the sick or the well from the body of the sick or the well. One does not deal directly with the mind. Nobody can, for that matter. The mind is just one of the functions of the personality. The personality is this thing of the patient, for the patient and by the patient which medicine so liberally neglects. Psychology makes no assumption regarding the nature of the mind. That is a matter for philosophy and wordy metaphysics. There is a unitary psychophysical organism which has experiences and reacts to the world in which it lives. The totality of this reacting, experiencing psychophysical organism is called a personality. The personality[4] is the totality of the whole organism, the body, functions, instincts, emotions, mind, experiences, reactions, defenses, superiorities, inferiorities, memories, scars, triumphs, funerals and skeletons. It is the *en masse* of the individual.

An academic psychologist would empty this hall save for the restraining politeness of a few. A clinician intimating problems of personality may, in the opinion of an older medicine, near the domain of hazy theory. One wonders why he does not talk of some disease or tell of some new treatment or read the usual paper. Even psychotherapy has not come to the confessed standing it deserves and to which it is well on the way. It is avoided by the science of medicine and welcomed by the art of medicine. Nothing is more different in practice than the routine papers of a medical society and the conduct of a medical ward; the paper is likely to omit the art and the ward to submerge the science in the art. Any clinician might do well to read the conversation between Christ, the prostitute Mary Magdalene and Simon.[5] He might catch a glimpse of the genius in psychotherapy that might relight his waning faith in his more narrow medical therapeutics. These antipathies of the internist probably result from the restricted idea that medicine is an art which devotes itself solely to the body, its diseases and accidents, and therefore medicine is a body medicine, the doctor a body doctor, the practice of medicine a body practice. True, at the other extreme is the psychiatrist, an individual doctor set apart who deals with individuals with upset minds or advanced degrees of abnormal psychology. Between these two extremes of body practice and mind practice are the large group of the neuroses which both attempt, and then larger still the ever-increasing number of patients as illustrated by Cases 2 and 3 above.

The trend of medicine in the last thirty years has tended to wean us from the personality toward the careful physical diagnosis, the laboratory and the machine. Medicine has developed the conscience of thoroughness, the will to pursue body signs and symptoms to a diagnosis. We are able and fitted to give our patients a good body study, but we are not in the habit of giving them a good personality study when the patient and the occasion demands it. A book on practice is largely a series of descriptions and discussions about pathological units called physical diseases. In the three volumes, thirtieth edition of Strumpell's[6] "Practice of Medicine," just from the press, the only definite reference to personality is in the brief definition that hysteria is "any manifestation arising from a disturbance of the normal relation between psychical and physical processes." This statement implies the separation of the work of the mind and of the body, yet admits that a

normal relation exists between them. There is no emphasis on that large group of patients with disturbed functions and usually without morbid anatomy who have much or little personality pathology and yet primarily are neither neurotic nor hysterical. On these patients apparently too often a multitude of tests and pictures are done, and that at comparatively much expense to the patient; a diagnosis too often is made on the reading of plates by a specialist who has never talked to or examined the patient or read the history, and the clinician has not even inquired into the content of the personality. The medicine of the future may emphasize a personality examination as much as a physical examination. One would be convicted of clinical folly who would belittle the laboratory or any of its fields, but the wise clinician yearns for proportion and perspective and believes the personality to be just as scientific a field as the urine or the fluoroscope, and far more neglected. A real diagnostic study investigates the whole of this psychophysical totality and believes every function equally the domain of science. It is a duty of science to find what is the matter with the patient, and one cannot do this in many cases by merely studying the body, the soma, the flesh, unless he would emasculate his opportunities for service. One doubtful of this line of thought might read with profit Pusey's[7] account of "A Doctor of the 1870's and '80's."

It is plain that there is no drag net in medicine that would sweep up a diagnosis from each patient by the same methods of investigation. We have come a long way in pathology, but we have a long way yet to go, for there are many variations and applications of pathology. Morgagni introduced the "anatomical concept" and gross morbid anatomy into medicine when he published his five books in his seventy-ninth year. Virchow followed in 1847 and onwards with his cellular pathology and also emphasized the idea that "no one man is infallible in respect of judgment or knowledge." From 1870 on what might well be called bacterial pathology was of strong influence, and since 1900 two more ideas in pathology have received much attention. The first of these is functional pathology as illustrated by McKenzie's contributions to the function of the heart muscle over and against the former emphasis on murmurs, and the ever-widening importance of functional tests, as the functional test of the kidney. The second is the passing of the old introspective and association psychology of the fumbling eighties and nineties when Wundt and James were at their zenith, and the coming to recognition of a real science of psychology. The internist with the new psychology to help, added to his own ever-increasing clinical experience with personality, can now begin to envelop the individual as a unitary entity in the problems of personality pathology. Human nature may be always the same, though I have always doubted this statement, but the pressure upon human nature with the increasing competitive stress, problems and reactions of the machine age will probably make more and more for a personality pathology. On the other hand, the better treatment of many diseases, the elimination of others, the better care of the individual by and for himself, the annual examination, the power of preventive medicine, together will no doubt tend to lessen the damage from cellular pathology. If there ever was a new day and a new time in medicine, it is now. Thoreau said that the laws of the "universe are forever on the side of the most sensitive." All men since evolutionary Adam had seen apples falling from trees, but only Newton was scientifically sensitive to a falling apple. Any internist can be a doctor of the body, but only the sensitive internist keyed to harmony, interpretation, understanding and explanation with the wholeness of his patience, through all the manifold medicine he can learn, live and become uncannily skilled in, will suffice for the service of his daily practice.

We modern internists pride ourselves on being scientific, a rather multiple implication of knowledge, thoroughness, progress in our specialty, and a general sense of efficiency to date. Our science is probably too often limited by the influence of our course in medical school plus the added observations and impressions of practice. From the layman's viewpoint, anything is scientific that keeps him well and cures him quickly when he is sick. He thinks far more of results than he does of science or its methods. He knows that one may have a disease which the doctor may name very glibly, and he knows, too, that one may be sick in mind and body as the direct result of the struggle with the problems and obstacles of life and not have any disease. The invasion of the personality may be the only way to understand the case, explain the symptoms, permit a diagnosis, and furnish the proper treatment. When a personality pathology is present, the internist with tact, thoroughness and forcefulness may enter into the life of the

patient until the story is told, the previous trends are plain, and the present emergency is sympathetically known. Maladjustment to a situation is just as scientific a problem as is albumin in the urine. The fact that a patient reacted to a particular difficulty in a particular way may but illustrate habitual modes of reaction that have been established and may serve to take both physician and patient back to previous episodes in the life of the latter that flood his whole story with explanation.

There is a personality pathology because everybody meets difficulties. Every man has problems to face, adjustments to make, thwartings to accept, mistakes to acknowledge, sins to regret, disappointments to confess, injustice to take gracefully. It is the way one meets these things that counts. If he meets them well and lives on his life, in the end they are little things. If he meets them poorly, reacts greatly to them and thereby interrupts the flow of his life, they are big things no matter how little. As clinicians we have tried to be exact in our diagnoses, paste labels on our cases and name them this or that, pigeon hole our personalities and call them stable or unstable, introvert or extrovert, wise or foolish, strong or weak, good or bad. No one is probably completely either one or the other of these. Therefore it is safer to try to recognize the trends and the tendencies in the personality and his ways of handling himself in the journey of life. The clinician can manipulate a personality to its own welfare and moreover make that manipulation just as tangible and practical a process as when a surgeon opens an abdomen, finds an appendix, and makes a tangible process of its removal. The great problem is to decide whether we are dealing with a cellular pathology, a functional pathology or a personality pathology, or variations and combinations of two or three. The clinician does well to entertain a unitary conception of the personality and thereby to learn enough of the individual to manipulate him over his complaints and dysfunctions to smoother thinking and normal living.

Personalities do strange things and more particularly when they are in difficulty. To the clinician they come only when in difficulty and when they are no longer capable of overcoming these difficulties. The effect of worry and strain over these insurmountable personal difficulties are often seen in reflected complaints from the viscera through the ever-active nervous system in one way or another. Personalities in difficulty construct some system of individual defense of almost infinite variety, of which the following are suggestive but by no means exhaustive. First, an individual may react by becoming moody and even indulge in listless brooding or day dreaming. Children suffering injustice become silent and self-conscious even to a real clouding of the life. Many of the habits and peculiarities of adult living may be traced back to the difficulties and misunderstandings of childhood. Second, the individual may become sick and sometimes really sick, not so much with a single namable disease, but sick all over in the entire personality. I have seen a strong engineer lie ill like death in a hospital with consultations and silly diagnoses merely because a woman whom he considered life itself had refused him her hand. To be sick is a very protective refuge for many women with personality pathology. In this sense, sickness is an inferiority complex, sick people get attention and thus the deeper problems lie quiet. Such patients with no objective signs or symptoms of disease present an opportunity to the clinician to find the problems and difficulties with which the patient is wrestling. With a shut door and alone with the patient, a kindly approach and gradual, the patient often spills his deep problems, psychic trauma and phantasies gladly as well as the realistic conditions persistent in his life. But the patient waits usually to be asked; he naturally does not speak until the environment makes it easy and he is sure of help. The physician has the task of going beneath the apparent and the conventional to the real and actual. Even the psychiatrist sees the dementia precox personality construct for his individual relief a wall of a world of fancy around himself, and sees, on the other hand, the manic depressive run into reality, live on the surface of things, react to the surface and never get below it. Probably every adult, one in one way and one in another, wears a protective mask externally in his manners and speech, and how much more so does the patient with foreign bodies in his soul need measures of defense.

The physician does not need to be either an authority or even widely read in psychology to be capable of great service to this class of patients. Of course, the more psychology he knows, the better clinician and helper he will be. Too many clinicians read in the press and magazines popular articles which claim to be psychology, whereas they are but frothy nonsense and only the outer and lunatic fringes of

a real psychology. The great upsets and contributions to psychology and psychopathology have come in recent years from physicians as illustrated by Freud, Janet, Hart, Jung, Adler and others, in addition to the studies of the academic psychologists. Dr. William L. McDougall is a medical graduate of Cambridge and has had much medical experience. To psychology the clinician should turn a welcome rather than a doubting ear.

"During the past few decades psychology has emerged with disconcerting vigor from the paths of academic quietude, and has laid claim to a substantial share in the practical affairs of mankind. It has asserted its right to a place in the proud structure of the sciences and its right to contribute to the understanding and control of the actual problems of human life. Among these problems is the causation and treatment of disease"—(Hart).[8]

The physician alone of all men has the ability to make not only the diagnosis of disease as such, if it be present, but also to say that no disease is present but that the personality probably affords in its recesses areas that need further exploration that signs, symptoms and complaints may be made fully clear. Probably in no calling is there as much opportunity afforded for the study of psychology as in medicine; nowhere is psychology more needed and nowhere is it more neglected.

The clinician desires to avoid "a whole family of psychologicomaterialistic confusions," but also he remembers that "to many observers, unfamiliarity is the same thing as unreality" (H. Jackson).[9] The main point is for the physician, through observation, reading and experience, to acquire not only as much of psychology and psychiatry as possible, but to keep his diagnostic faculties attuned to all the varieties of pathology that present themselves and no matter in what guise. No one deals as much with the pathology of flesh as does the professor of pathology. To him personality reflected in abnormal function of various organs is a view of medicine he does not see. His unfamiliarity with it is not proof of its unreality. Recently I took Professor Roy R. Kracke, of the Department of Pathology of Emory University, through the wards of the Emory University Hospital and showed him examples of personality pathology and the neuroses. When one realizes that probably one-half of all the patients seen by urban internists are of this general class, and if autopsies were done on such patients no pathology of moment would be found, we can see the force of Professor Kracke's comment when he said, "And to think, I teach pathology." Nevertheless, these patients must be approached, studied, their problems and personalities illuminated, and themselves relieved and improved as much as is possible.

It would seem that this is another burden for the internist and the general practitioner, only the latter has been impressed and done passing well with this burden in his own good and human way, though encompassed about with his ceaseless duties and interruption. These cases take time and sometimes are wearying. The internist has only so much time and strength. After thirty years of it he is more easily worn with human woe and the problems of diseases as well as of personality. There is reason to believe that a new and larger souled internist is gradually in the making. His knowledge will be better arranged and more practical. He will know all the present day internist knows, and far more. It will probably be a more selective and wider knowledge. He will deal more with the science of human life as psychology more firmly infiltrates itself into clinical medicine. He will be a better scientist as well as a better therapeutist. His interests in medicine will be broader because his interests in human folks will be broader. He will know more of medical economics, sociology, heredity, and be more adept in studying environment and in changing unfavorable environment. Not only will he think of his patients in terms of science, but he will feel for them as well. He will be more widely read and more easily at home with human problems. No longer will he be merely a tissue or function physician, because he will function in the larger human environment of the personality. He will be a scientist and a clinical artist, and also have a *religio medici* all his own that will open to him a larger life, interpret in a larger way his experiences and make him a far more capable physician. He will sit with those who worship and worship with them. He will keep in touch with the Infinite that he may better touch the Infinite in his patients. Many heads nowadays well filled with a narrow medical knowledge have lived so long so far from the spiritual and intensely human that their hearts have gone to sleep while the coldly intellectual phase of themselves still works on. We want not less but more intellect, not less but more feeling, not less but more personality, to the end that the fullness of life at least may be glimpsed, if not attained, by those who receive the benefits of medicine. Peabody caught this vision when he wrote of "The Soul of the Clinic." The care of the patient is a very large care and

far more than of the flesh fleshy. Truly the art is long and increasingly inclusive of many gifts.

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DISCUSSION (*Abstract*)

Dr. W. W. Young, Atlanta, Ga.—For years we have been trying to interest the medical profession in psychiatry. The internist has too long had his attention focused on isolated pathologic processes. Someone has remarked that the psychiatrist is the only general practitioner left. By this he meant to convey the fact that the psychiatrist must take into consideration every element which may influence and have part in the behavior picture: the personality as a whole. This means a study of the individual from both the biologic and psychologic standpoints. Fortunately the internist is waking up to these facts. We have too long dealt with kidneys, eyes, ears, teeth and hearts and have not taken the organic make-up in its entirety into consideration.

About two weeks ago Dr. Woodruff was talking over the radio. He was enumerating the various schools of psychology with their diversified attitudes. He made a very cogent statement, namely: that there is only one sane attitude to take, and that is a middle ground. When a discovery is made, the discoverer is apt to become overenthusiastic and attempt to spread it out too thin. This happened in the case of Freud. He undoubtedly pointed a way. Watson and the behaviorists came to plant our feet more definitely on the ground where we had been soaring into metaphysical heights. But there is a middle ground. This middle ground lies between the extreme internist or the mechanist and the extreme psychiatrist or introspectionist with his rather metaphysical trend.

The internist can no longer confine his attentions to isolated pathologic processes. He must take into consideration remote influences. An organic pathologic process may eventuate in loss of emotional balance. On the other hand, chronic lack of emotional balance may eventuate in organic pathologic processes. Thus a complete study cannot leave out of consideration any of the various facets which may throw light upon the problem. We must consider the organism in its entirety.

In closing let me commend this particular showing. It is a step in advance. For two years the neuropsychiatric section has made a play for coordination. We need more discussion from both angles. Our leading medical colleges now are presenting clinics in which the internist and psychiatrist cooperate. We need more of this in order to develop greater breadth.

RECURRENT AFFECTIVE STATES: THEIR DIFFERENTIATION FROM PSYCHONEUROSES*

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The extramural psychiatrist who is closely associated with a general hospital and with physicians who are in consulting practice is frequently called upon to differentiate between various types of hypochondriasis. After exhaustive medical and surgical studies have been conducted the physician decides that the physical and laboratory findings are inadequate to explain the complaints and illness of the patient. The diagnosis in this particular type of illness is of great importance because intelligent therapy and prognosis can not be given without differentiating between the "circumscribed hypochondriacal" illnesses which form the subject of this paper and the other types of hypochondriasis which are not by their nature self-limited in their course. Frequently disastrous results follow from the failure to recognize the essentially depressive or affective nature of the "attacks" of hypochondriasis.

Depressions of the manic depressive variety have always been known to the general physician and it is from these severe cases, which require mental hospitalization, that we have learned the nature of the less severe cases which I am about to present. I believe that every case of depression (and all of the affective psychoses indeed) can be analyzed into three separate clinical components. That these three components are

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sound divisions of the affective disorders is evidenced by the fact that anyone of them can be present without the appearance of the other two. These three symptom groups are: (1) the affective or mood component, that is, depression, or elation, or anxiety, or fear; (2) the disturbance of psychologic mechanics as shown in the depressive cases by the slowness and difficulty of thinking and talking, the difficulty in concentrating, the loss of energy and normal drive and ambition, the fatigability, the reduction in sex interest and activity, the loss of appetite, the disturbance of sleep and the diurnal variation in symptoms; (3) the content disturbance which may take the form of depressive delusions on the one hand, that is, delusions of guilt or, on the other hand, may translate the sense of the lack of physical well being of the patient into somatic or physical complaints. As I have said, any of the three components may exist without either of the other two. The most important cases for our present consideration are those which present themselves with hypochondriasis and the mechanical difficulties, but without the depressive component. The depression or mood disturbance is frequently so slight that it escapes recognition completely. Even on direct questioning there is at times no admission by the patient that there are any "blues" or depression.

The affective disorders of this type which present themselves with a variety of symptoms for which no adequate organic etiology can be found are frequently undiagnosed because of the absence of the depressive component and because the history taking does not bring out the mechanical disorder, the difficulty in concentrating, sleep disturbance, diurnal variation, and so on. Not infrequently a patient may not have depression for the several months after onset and then suddenly be overwhelmed by what he calls discouragement, but which in reality is the appearance of the depressive component of the affective illness. If any of the mechanics symptoms can be elevated into the position of greatest significance, it is the diurnal variation in symptoms. Not infrequently a patient will have such pronounced diurnal variation in symptoms that each night he will feel as if he were well and each morning will be engulfed again by his symptoms. It is curious that this diurnal variability of symptoms has been so neglected by clinical psychiatry. The loss of energy and pep is also important as a symptom, because frequently the patient's only realization of general illness is that he is not up to his former standard of enthusiasm and energy.

The content disturbance of these cases is the mass of hypochondriacal complaints with which the physician is so familiar: gastrointestinal symptoms of gas, abdominal discomfort, constipation, "mucous colitis," and so on; headaches of odd sorts; pain all over the body centering in the various regions of the body or in special organs; as well as anxiety symptoms, such as palpitation or shortness of breath. Complaints of this sort must be differentiated from the malignant type of hypochondriasis which we see in the schizophrenic development. I think we can safely use the following rule of differentiation. If the complaints might be derived fairly directly from physical disease the hypochondriasis is benign and compatible with the affective disorder; if, on the other hand, it departs far from conceivable physical disease it is to be regarded as a more serious type of symptom. Frequently the clue to the diagnosis is the presence of masked feelings of unworthiness. On questioning, the patient may admit that he feels a sense of guilt on one score or another.

The onset of these affective hypochondriases usually can be dated and they are frequently reactive to some upsetting psychologic situation, although they are not always acute in onset and are not necessarily reactive to any known difficulty.

Let me present a group of cases, six without depression and six with only slight or masked depression.

All of these cases have either recovered or else the test of the accuracy of diagnosis has been the recurrence of the same type of illness. The first six cases show the type without depression. The second six cases show some depression, which, however, was very much masked.

Mr. B. L., age 44, married, complains of a bearing down pressure in the head; vice-like constriction; nervousness; his head feels mixed up; lack of decision.

The onset occurred in September of 1924 with feelings of sluggishness and lack of "pep;" fear of being "boxed in" on trains; feeling of indecision and definite morning and evening variation in symptoms. He emphatically denies any blues or depression. There had been a previous attack two years before, precipitated by the death of his father, long illness of a sister, and overwork in starting a new business. The present attack had no definite precipitating factors except the discovery of the pregnancy of his wife, to whom he had been married only a few months. Perhaps more significance could be attached to this because of the patient's late marriage (age 44) and his great devotion

to his father and sister. One sister was nervous; a brother had had an attack with loss of weight and loss of pep. Recovery was predicted on the ground of the formal aspects of the case: indecision, feeling of sluggishness, loss of pep, and morning-evening variation in symptoms. He recovered in less than a year.

Lieut. D. H. C., age 25, a naval officer, single, complains of nervous indigestion, gas in the stomach, difficulty in sleeping, which has lasted for six weeks. He denies depression emphatically, but his eyes give the impression of "blues." Five months preceding the attack the patient became attached to a young married woman. Two weeks preceding the onset of his illness the woman intimated that she intended to get a divorce. The patient, a week later, intimated that he would marry her if she got her divorce. The day preceding the attack the patient learned that she was actually to visit his home. He was greatly attached to both parents. His father was much opposed to divorce. The patient's previous life was quite normal. The patient, although outgoing with many friends and good interests, has a feeling of mild revulsion against sexuality, especially illicit. He recovered in four months. It was apparently a psychoneurotic anxiety depression, *sine* depression.

Mr. W. L. H., age 40, married, a real estate contractor, for a year had had difficulty with breathing and digestion. He felt as if he could not get his breath and had to stretch in order to get rid of the tension feeling between "his pelvis and shoulder." He worried easily and was tense without any due cause. His symptoms are very pronounced in the morning; by 12 o'clock noon he feels much better, and by evening he feels jolly and happy.

In the previous year his sex interest and potentia had markedly diminished and intercourse was always unsatisfactory. There were no upsetting factors except the sudden death of a 4½-year-old daughter 8 months preceding the attack. Following this there was a three months' period of normal bereavement.

He recovered after 17 months. This was an anxiety hypochondriacal depression with no outspoken effect, but marked reduction in sex interest and striking morning-evening variation in symptoms.

Mr. D. W., age 27, single, a gasoline dealer, came for consultation because of a series of attacks in which there was difficulty in focussing the eyes, with sweating of the right hand, tremor of the left hand, and palpitation. The onset came 8 months before. The number of attacks was reduced after 5 months with the development of some sense of unreality and feeling of vagueness. The patient is the only son of a prominent physician. He was reared by the father, who is a dominating personality, tremendously devoted to the patient and disappointed that the patient did not succeed him in his profession. The patient was a precocious lad; did brilliant work in college until his last year, when he began to lose interest in his work, was physically run down and actually failed in his studies. After 18 months he went into business and again his success was brilliant. At the time of the first breakdown the patient had a nephritis. Two months preceding the present illness the patient had an appendectomy. He then began to lose interest in his work, delayed decisions, and began to have the attacks noted above. He lost much weight, noticed a complete dropping out of sex interest, and all of his symptoms showed marked diurnal variation. He denies any definite constant depression, but complains of feeling loggy and lacking in initiative. He recovered 20 months after the onset of symptoms. This was apparently a recurrent depressive reaction with loss of energy, of initiative and of decisiveness, loss of sex interest with a definite diurnal variation.

Mr. W. L., age 56, single, an army officer, complained of indigestion, sleeplessness, tension, fatigability and weariness.

He was a very successful army officer, even-tempered and not given to enthusiasm or worry. At 27 he had an attack in which he was run down for 8 months, and a second attack at 33, with a feeling of weariness, lack of desire to do anything, felt below par, and had trouble with indigestion. He recovered in 1 year. This was his third attack. He denied any depression in any of the attacks. He had difficulty in concentrating, subjective loss of memory, but objectively none. There is a definite daily rhythm of symptoms with restlessness coming in toward night.

He had apparently a recurrent depressive reaction with loss of work drive, difficulty in concentrating and a diurnal variation in symptoms.

The second six cases represent the same type, but the depression is expressed, although always occupying a background position and expressed when the patient is pushed by leading questions.

Mr. J. P., age 51, bronze manufacturer, married, complains of pain in the legs and back. The patient was always a hard worker with interest restricted to his work; always irritable and moody; constantly quarreling with his wife, although they were very fond of each other. Seventeen years before, the patient had a breakdown which lasted several months with many gastrointestinal complaints. Four years before the present illness he had an attack of aphonia of 4 months' duration following a period of excessive quarreling with his wife. There was definite accentuation of his depression during the attack. Recovery came 17 months after onset.

Mr. J. C. M., age 44, married, a real estate dealer, complains of constipation, fatigability, weakness, constant preoccupation with symptoms, sleeplessness, loss of libido and potentia. The patient had always been a genial, good-natured, friendly outgoing personality. The illness began suddenly on March 7 and the patient promptly consulted a gastroenterologist. (The patient's father was a drug addict.) He was mildly depressed, but felt no difficulty in concentrating, but his symptoms showed a marked variation from morning to evening. There was recovery in 8 months. Apparently, this was a hypochondriacal depressive reaction with marked diurnal variation in symptoms.

Mrs. I. P., age 50, married, a housewife, consults physicians because of palpitation, roaring in the head, colitis, stomach trouble, nausea after meals, excitability and depression. An attack came on suddenly July 18, 1923, immediately following the decision of a sister, to whom the patient was greatly attached, to go West. The patient had a nervous attack of one year's duration 8 years before. The patient's mother was extremely nervous, as was the patient herself. She had had migraine headaches from 13 to 45, menopause at 47. She delayed marriage until 38, after 10 years'

courtship. She was a stay-at-home, fearful kind of person. There was definite morning-evening variation in depression and anxiety and hypochondriasis. She showed rapid improvement after one year of illness, and then recovery.

Mr. A. J. K., age 43, married, a manufacturer, complains of pain in the head, running down to both shoulders and into the chest; muscular pain in the chest; sleeps poorly. The attack had lasted 5 weeks. It was precipitated by the death of his father. There was slight depression, but marked morning-evening variation in symptoms. There had been previous attacks, one 7 years before of 1 year's duration, another 3 years before following the death of his sister. Both attacks were characterized by generalized pain, irritability, and marked diurnal variation in symptoms. There was a recurrent depressive reaction with mild depression, prominent hypochondriasis, and diurnal variation in symptoms.

Mr. L. G., age 42, married, an accountant, complains of the following symptoms of 1 year's duration: flashes before the eyes, stuffiness in the ears, sleeplessness and worry that he might become deaf. Referring physicians reported a slight stationary optic atrophy and a slight chronic inflammation of the Eustachian tubes. The patient had a breakdown at 21 with depression and loss of weight which was treated as tuberculosis. No bacilli were found at that time. The patient had been carrying on frustraneous sex relations for 6 years with his secretary. His father, whom he disliked, died just before the onset of the present attack. His death revived, however, memories and remorse of an "affair" with his step-mother. With the breaking of the relations with his secretary there was prompt cessation of symptoms. His depression was never marked, but present. There was definite diurnal variation in symptoms, with sleeplessness. He had had three subsequent attacks of ear discomfort and "flashes before his eyes," with depression and sleeplessness; business worries were blamed for each, but each was precipitated by clandestine flirtations. Each cleared promptly on ventilation. This was recurrent depressive reaction, having hypochondriasis as a prominent symptom, with mechanics of depression, and each dissipated by correction of the precipitating cause.

Mr. W. H. P., age 65, a widower, banker, complains of mucous colitis; bowel trouble; dizziness; tightness in the head; nervousness and fatigability. The patient had always been highstrung and emotional and spoiled by his wife. His wife was frigid. His flirtations began shortly after marriage (at the age of 23). At 36 he had facial palsy and a diagnosis of nephritis. Then followed 1½ years of nervousness, with marked gastrointestinal symptoms and some depression and year-long dietary caution. Two years previously occurred the fatal illness of his wife, and then remorse over an illicit liaison. Then began a marked gastrointestinal hypochondriasis with excessive examinations and rectal instrumentation. His sleep was disturbed; there was reduction of sex power; definite but hidden depression, with marked diurnal variation in depression. He recovered after 3 years.

In considering the importance of making the correct diagnosis in these cases let me stress first the danger of suicide. One cannot predict when depression will make its appearance and perhaps overwhelm the patient, or whether suicide may not occur as a solution of the feeling of physical inadequacy that is apt to be prolonged. Secondly, therapy can not be intelligently carried on without the recognition of the essentially self-limited course of the reaction. While specific problems may need analysis and solution, nevertheless recovery can not be definitely hastened or produced by any specific psychotherapy as far as I know. I do not mean to say that psychotherapy is not valuable to the patient in helping him to understand his illness, to bear the months of illness without too much discouragement, and to correct personality traits which have perhaps contributed to his breakdown; but I think we must recognize that in our present state of knowledge we have no assurance that anything we do psychotherapeutically can shorten or change the course of the affective disorders.

Unless we recognize that we are dealing with an affective self-limited disease we are in danger of saddling the patient with permanent disease ideas. If we treat the gastrointestinal tract because it is symptomatically involved the patient may never be relieved from the idea that he has had an ulcer or an enlarged liver or that he needs to watch his diet for the rest of his life. I have known patients to have the fear of heart trouble, and legitimately, for many years after the recovery from a definite hypochondriacal depression because the heart was treated with digitalis where palpitation occurred as a symptom. The physician has this justification for the treatment of organs when no organic disease exists: and that is that the patient wants organic treatment. But the wise and honest physician does not use quasi-fake therapy when honest and sounder methods are at hand. Consistent reassurance of recovery, attention to sleep and weight, guidance of the patient's activity so that he is not subjecting himself to more strain than he is capable of handling either in work or social activity, or being subjected to it by friends and family: these are the methods of psychotherapy which are legitimate and honest and finally earn the patient's confidence and respect. If we try psychotherapy of the more psychoanalytic type without clinical recognition of the type of illness with which we are dealing, we discourage our patient and discredit the method.

We therefore wish to emphasize a type of hypochondriasis which is really an affective disorder equivalent, which is characterized by the typical mechanical symptomatology of the affective disorders, and which runs a course and ter-

minates in recovery. It is important to recognize this group of cases to guard adequately against suicide; intelligently to help the patient and his family; and to prevent the institution of faulty and discouraging therapy.

DISCUSSION (*Abstract*)

Dr. A. L. Skoog, Kansas City, Mo.—Dr. Hohman has stressed the feelings relative to somatic functions. He calls our attention to the colitis which frequently occurs in these patients and the gastrointestinal symptoms. Perhaps many of you are aware of the recent book by Alvarez, in which he stated that a very high percentage of patients coming for gastrointestinal treatment come in the neurological or neuropsychiatric group. Undoubtedly many of them can be classified in the group which Dr. Hohman has presented.

I judge that Dr. Hohman does not classify this condition as a distinct disease entity, but considers it a syndrome involving functional troubles relative to the brain. Certainly there has never been demonstrated any organic trouble in the brain in these cases. Since some patients commit suicide, opportunity has existed for pathological examination. In text-books we find this aberration classified as hysteria, hypochondriasis, psychosis, psychoneurosis, and so on. Perhaps many terms that have been applied are not good.

Not long ago I ran across this subject in a text-book of sixty years ago. The author referred to "affective insanity," and then promptly debated whether many of these patients so classified should be considered as insane.

I consider the case of the naval officer, age 25, as perhaps one of the most interesting cited by Dr. Hohman. I would judge that this young man was a somewhat hypersensitive individual, particularly relative to moral affairs.

The lady at the age of 50 described with depression possibly might have had some endocrine disturbance, although her illness occurred about three years following the menopause.

Dr. R. Finley Gayle, Jr., Richmond, Va.—I agree with Dr. Hohman that this particular affective mental state should be differentiated from other types. The group which he selects for this classification is essentially different from the definitely psychotic group.

I am not altogether in accord with the statement that the disease is essentially self-limited, and that recovery cannot be hastened or produced by any specific psychotherapy. It is my belief that the course of almost any affective mental disorder can be materially shortened by properly applied and sympathetically applied psychotherapy, and that the likelihood of recurrences of the affective psychoses can be to a measure prevented by the proper understanding of the mechanism and early symptoms of their affective mental disorder by the individual. If the patient is allowed to have an insight into his own condition it will certainly help him in the future to adjust himself to situations which arise and which may precipitate a psychotic state.

It is, of course, unnecessary to stress the point of early recognition of a hypochondriacal group before this group of men. It is indeed important, however, that these patients be analyzed and understood by the physician as well as by themselves early in the course of the disorder, because if these conditions are adjusted early a severe condition will probably be prevented, and the fixation of the ideas so common to this particular type of disorder may be circumvented.

Dr. J. J. Gable, Norman, Okla.—The affective states described by Dr. Hohman certainly must include acquired neurasthenia. Kraepelin years ago wrote in detail about the chronic nervous disorders which he called chronic nervous exhaustion or acquired neurasthenia. In these days of depression we are seeing more of this type than ever before. These nervous exhaustives always feel very badly in the mornings; by the middle of the afternoon they usually feel well. In the mornings they hang around outside of the house, usually to themselves, do not want to see anyone, but by 4:00 p. m. they are ready for a game of golf, chat freely with their friends, or condescend to go to a party with their wives.

We believe that Dr. Hohman is right when he says psychotherapy has little to do in bringing an early end to these affective states. Superficial analysis no doubt would bring about a clearer understanding of their ailments and perhaps make the patient more comfortable, but generally speaking I believe that the affective states are self-limited.

Dr. Temple Fay, Philadelphia, Pa.—I am particularly interested in the diurnal changes reported by Dr. Hohman in his study. I believe cerebral activity is greatly influenced by the physiological changes of fluid accumulations of the cerebrospinal fluid system and the secondary vascular disturbances which manifest themselves in mild circulatory deficiencies. I believe these mental conditions are dependent upon the function of the organic structures and that the physiology of cerebral circulation determines the efficiency in many instances. The need for oxygen at all times to maintain cerebral function, and the rapidity with which oxygen can be made available in terms of circulation, offer a field of study for the psychiatrist that will undoubtedly clarify many of his problems, especially those associated with mental deterioration and variable behavior reactions.

Swift's work on the venous drainage system of the brain as well as Lennox and Cobb's investigations concerning the arterial factors are extremely important. Gamble's work covering the important considerations of fluid storage and water metabolism plays a large part in cerebral activity.

We have been able to demonstrate that volumes of spinal fluid vary in some proportion to the amount of fluids ingested by the individual; that with the increase of spinal fluid volume there is a decrease in circulating blood volume, and until the psychiatrist standardizes his patient on a fixed diet with a known and constant amount of liquid intake, it is useless to draw conclusions regarding the mental activity in terms of psychic phenomena until the factors surrounding cerebral volume and pressure have been carefully controlled.

The careful study of the patient's physical limitations, especially the developmental anomalies of the cerebral venous system which delay the return of blood to the heart through obstruction in the extracranial course of the jugulars, as well as overaccumulation of cerebrospinal fluid through the defective filters, will bring us closer to a rational understanding of the problems of psychiatry in terms of concrete organic structures.

Dr. Hohman (closing).—I am certain that ultimately we will find that every psychologic state or change has a corresponding physical basis. These will follow each other like a shadow, but only the future can tell us which element is the primary one in the individual situation.

As to the question of whether psychotherapy alters the course of these depressive mental states, in the present state of our knowledge, we have no evidence that it does. Since we have no criteria for predicting whether a depressive state will be of long or short duration, even in cases where the psychogenic basis of the case is clear and alterable, or where we have the experience of former depressions in the same patient, I can not see that we are justified in assuming that psychotherapy is efficacious in terminating depressions.

I do not mean to say that adequate care of patients is not imperative. I quote the case of one patient who has been through three hypochondriacal depressions and has been left with a chronic gastrointestinal fadism because the depressive nature of the illness was not recognized. As I pointed out in my paper, the encouragement to carry on, the avoidance of suicide and medical bunk, the adjustment of conflicts which are brought out in the depression, are important psychotherapeutic approaches; but not with the hope of altering the time course of the illness.

COLOSSAL EMPHYSEMA OF UPPER EXTREMITIES: FOREIGN BODY IN THE LUNGS*

By E. W. Carpenter, M.D., F.A.C.S.,
Greenville, S. C.

We were called to see a three-year-old child with the following history. Two days previously the family physician had been summoned late at night to relieve a severe dyspnea. He injected 10,000 units of diphtheria antitoxin, thinking the case one of diphtheria. The child's condition became worse and he was sent to the hospital for further study. A careful history revealed that four days previously, while eating peanut brittle, he had a severe choking spell, recovered and began coughing the next day. The cough had persisted until the present. The dyspnea began on the third day and coincident with the dyspnea the child began to "swell."

He looked like a gargoyle, a grotesque body with match stems for arms and legs. This was caused by a subcutaneous emphysema extending from the pubes over the whole body, neck, face and scalp. The eyelids looked like baseballs. Respiration was not greatly embarrassed, temperature was 105°, the chest could not be studied physically because of crepitation caused by the emphysema.

X-ray revealed a normal chest except for a definite blur in the right bronchus. No pneumothorax was present.

We removed several fragments of peanuts from the right bronchus. They had been inhaled by the child while eating the peanut brittle. The emphysema slowly subsided and he made a perfect recovery.

How can one explain the emphysema which was unique in our experience, with the chest showing a complete absence of any pneumothorax? We at once set aside any thought of injury to the mediastinum and concluded that the trachea had been wounded by a sharp point of the peanut brittle, that this wound remained closed until the dyspnea from subglottic swelling supervened. This with increasing cough increased the intratracheal air pressure sufficiently to force the large quantity of air through the tracheal wounds under the skin of the neck and from this point of origin it spread over the entire body.

The tracheal mucosa was greatly swollen and no wound was observed.

There is no doubt that there was a rupture in the respiratory tract. However, the mechanism and the site of rupture are questionable. Another possibility is that the place of rupture was lower down, perhaps in the right main bronchus, the air getting into the connective tissue spaces of the lung through the hilum and up into the fascial planes of the neck by way of the mediastinum. The fact that there was no pneumothorax and the blur in the region of the right main bronchus are evidence leaning toward this mechanism. However, it must be said that the recovery of the patient in the face of a mediastinitis which must have occurred if the mechanism followed this pathway is remarkable, and although possible is not probable.

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A RECEPTACLE FOR OBTAINING SPECIMENS OF URINE FROM INFANTS AND UNTRAINED CHILDREN*

By Howard Hailey, M.D.,†
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The apparatus shown and illustrated here consists of a glass receptacle which can be boiled and a "hammock napkin" or harness for holding the receptacle in place.

From a side view the receptacle or urinal is wedge shaped. The external flange or bead encompasses the urinal. The distal side of the flange meets the body of the urinal at a ninety degree angle. This right angle

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receives the edge of the opening in the napkin. The back of the urinal is flat and is the resting surface of the urinal when it is not in place on the child. The front or face of the urinal is so molded that it anatomically fits the child. The upper part of the face of the urinal is perforated so that the opening is flush with the wall of the urinal. This facilitates pouring out the urine. There is a ridge which fits between the lips of the vulva. The surface is stippled to increase friction, thereby reducing slipping of the urinal.

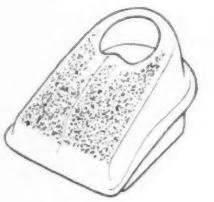


Fig. 1 (top) — Anterolateral view showing urinal resting on back or bottom.

Fig. 2 (center)—Side vertical view of urinal.

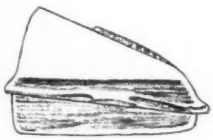
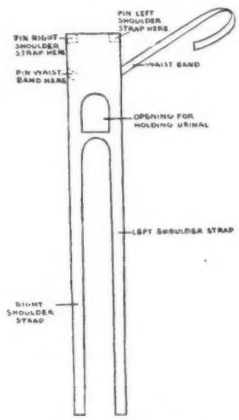


Fig. 3 (bottom)—Side horizontal view of urinal showing contained specimen.



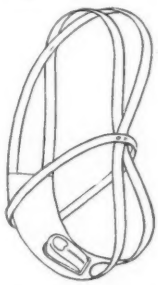


Fig. 4 (top)—Hammock napkin or "harness."

Fig. 5 (bottom)—Posterolateral view of hammock napkin or "harness" showing fixed position of urinal.

The "hammock napkin" or harness is readily made from two layers of Indianhead cloth. The straps are long enough to pass between the legs, backwards and upwards, crossing in the back, passing over the shoulders, crossing again over the chest and to be pinned to the re-enforced upper part of the body of the "hammock napkin." There is a waist band which is pinned in the back where the shoulder straps cross, and then again in front opposite the sewed end of the band. This strap is for the purpose of holding the urinal against the vulva should the child sit up. The "hammock napkin" or harness is easily laundered. A fresh napkin is used in obtaining each specimen.

Two strips of adhesive are used to make the napkin secure against the urinal. The adhesive reduces breakage of the urinals by preventing them from falling out of the "hammock napkin" while the apparatus is being applied.

This receptacle offers the following advantages:

(1) Excoriation, infection and accompanying pain is abolished, since adhesive is not applied to the skin.

(2) Uncontaminated specimens are obtained if the apparatus is properly applied and pinned snugly.

(3) The time of voiding may be noted without removing the apparatus.

(4) The "hammock napkin" may be adjusted so that it is practical for all infants and untrained children, male as well as female.

(5) Constant attention of the nurse in charge is no longer necessary while obtaining a specimen.

(6) The urinal may be used by an intelligent person without the aid of the "hammock napkin," using an ordinary napkin to hold the urinal against the body.

(7) When the child is wearing a shirt of non-elastic material the "hammock napkin" may be pinned to the shirt in front and behind, not using the shoulder straps. Even here it is advisable to use the waist strap.

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SYMPOSIUM ON MALARIA, Part 2*

OBSERVATIONS ON MALARIA INCIDENCE IN SOME UNSANITATED RIVER VILLAGES IN THE REPUBLIC OF PANAMA, WITH SPECIAL REFERENCE TO PROPOSED CONSTRUCTION PROJECTS IN THE CANAL ZONE*

By H. C. CLARK, M.D.,†
and
W. H. W. KOMP,‡
Ancon, Canal Zone

The methods usually applied in the control of malaria consist in permanent drainage or routine treatment of anopheline mosquito breeding areas, screening of living quarters and the hospital and dispensary treatment of malaria for those who seek such medical care. Measures in malaria control seldom include the treatment of that vast number of rural people who really form most of the seed bed of malaria and perpetuate the risks of transfer to contacts living under better circumstances. Usually people who pass their lives in these rural areas show a comparatively high tolerance to the disease and they are not therefore prone to follow a complete, vigorous course of treatment that would in many cases eradicate it. We are interested in studying and stimulating control measures directed at this seed bed of malaria. It is fully realized that this branch of malaria control is expensive, but it should be attacked with the same vigor, use of funds and personnel that mosquito control receives. The screening or mosquito-proofing of quarters, mosquito control, and efforts toward eradication of the infection in human carriers should proceed together and with equal emphasis if circumstances permit. Unfortunately financial circumstances and other conditions frequently make this ideal impossible.

The Panama Canal Zone, in its strictly sanitated area, has for years presented excellent evidence of what can be done in malaria control by the use of screened quarters and mosquito breeding control. Rural labor units sent outside the sanitated zone for duty also receive unusually good protection if the individual will take full advantage of the opportunities provided. Here, however, trouble develops. Most rural units are well protected during the working period of the week, but they spend the week-end too frequently outside protected or sanitated areas. It is the rural organization in contact with uncontrolled malaria seed beds that excites interest. We have had the good fortune during the past year to assist the Health Office of the Panama Canal in studying the malaria parasite index in rural inhabitants outside the sanitated zone and also to perform monthly blood film surveys on workers engaged in the road building and in the preliminary construction work on the Madden Dam, which will be located in the mid-basin of the Chagres River.

It is morally certain that a large fraction of the labor force to be used in the building of the Madden Dam during the next few years will not be satisfied to live in the protected camps provided for them, since there are too many small rural villages near by in which they can provide themselves with their own quarters and live with their families. We have selected for our present topic of discussion five of these villages. They lie just inside the Republic of Panama on the banks of the Chagres River with one exception, and this village is a short distance away on the bank of the Gatuncillo River, which is a branch of the Chagres. Many of the men now engaged in the preliminary work at Madden Dam go home each night in their own little river boats. No doubt these villages will be greatly increased in population during the years in which this project will be developed. It takes the men in the remote villages about an hour in their boats to reach their work. These villages are populated at present very largely by river folk that have had little contact with the outside world. Until recently they had no local medical or sanitary help. They depended on river water for all household uses and had no latrines or pit closets. The vast majority of the houses have a thatched roof, cane walls and dirt floor, and nearly all of the houses are quite near the river bank. These people cultivate small farms, and most of these are from one to two days' river travel upstream from their village. This means that they divide their time between their home villages and farm houses, this making it extremely difficult to follow a regular schedule of treatment or survey work. Vast potential breeding areas for mosquitoes are all about these locations in the form of grassy river banks, river bayous or lagoons and small collateral brooks that run through the villages. These five villages provide an excellent, unmolested rural river location for the study of malarial problems. We began our observations in these places in cooperation with the Republic of Panama and the

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*Part 2 of a Symposium on Malaria, comprising principally papers and discussions before National Malaria Committee. Part 1 appeared in the May issue of the JOURNAL, pages 521-551. Part 3 comprises reports before National Malaria Committee and will not appear in the JOURNAL, but will appear in a reprint of the complete Symposium—Parts 1, 2 and 3. The reprint may be secured from the Southern Medical Association, Empire Building, Birmingham, Alabama, or from Dr. Mark F. Boyd, Secretary, National Malaria Committee, P. O. Box 793, Tallahassee, Florida.

Panama Canal so that our work might have some practical bearing as well as laboratory value. We hoped that one year's experience would direct us in formulating future plans in these locations in contact with the development of the Madden Dam.

We had expected during the year to pursue routine observations on the following points:

(1) Mosquito density in quarters.

(2) Mosquito breeding areas.

(3) Primary survey for the malaria parasite index, spleen index and hemoglobin index.

(4) Provide the villages with a community nurse, free quinine and voluntary administration of the drug.

(5) Monthly surveys for the malaria parasite index for a year under voluntary quinine administration.

(6) Record the character of cooperation of the inhabitants.

(7) Study the babies with regard to the age at which they acquired malaria and thus provide some information on exposure to new infection in such places.

(8) Note the rate of gamete carriers in relation to gamete carriers that might be considered good mosquito infectors.

(9) Note the number of heavy infections found that are of the usual hospital intensity type.

(10) Note house and individual incidence during the year.

A detailed monthly report on mosquitoes caught in quarters and in traps and the routine searches of potential breeding areas for mosquito larvae cannot be given for the year due to conditions and interruptions we could not control. However, the anopheline flights and catches in quarters during the first six months of this period were not so extensive as we anticipated and not so extensive as the low inhabited sea coast plains exhibit.

Sampling of the huge river bayous revealed very little evidence of anopheline mosquito breeding, although the small brooks and poo's behind the villages show such breeding except in the dry season months.

Primary Survey of Inhabitants.—The initial examinations were conducted in two villages (New San Juan and Gatuncillo) in December, 1929, while Santa Rosa, Guayabalito and Las Guacas were examined in September, 1929. We examined once, by the thick film method, 260 children (15 years old or less) and found 147 of them positive, or a rate of 56.6 per cent; 339 adults revealed 126 cases, or a rate of 37.2 per cent. The total parasite rate was 45.6 per cent and the total spleen rate was 21.8 per cent.

These people are strongly negroid in type and do not show the degree of splenic enlargement commonly found. Only sixteen of them had spleens that extended more than two fingers below the costal margin. Of the 273 individuals positive for malaria parasites, only 48, or 17.5 per cent, were of the hospital intensity type. There were 160 cases of *P. falciparum* infections and 51 of them showed crescents, but only 8 of them in such abundance that they would be considered good mosquito infectors.

The hemoglobin index was taken by the Tallquist method on 508 of the inhabitants and 153 (30.1 per cent) ranged between 30 and 60 per cent, while the remainder, 355 (69.9 per cent) scaled between 70 and 80 per cent.

Treatment.—Compulsory quinine treatment was in effect at the Madden Dam screened labor camps and with this as a yard stick we instituted in the contact villages voluntary free quinine treatment under the direction of a community nurse, who was given assistance by school teachers in three villages and by the corregidors in the other villages. After each survey, the list of those positive for malaria was given the nurse and each adult case was supplied with enough of the drug to carry out a ten day course of treatment of 20 grains a day, while children received a graded dose of the drug, according to size, for the same period of time. Anyone who developed fever between the periods of survey was supplied with quinine and second day visits were made by the nurse to encourage those with malaria to keep up their treatment. During the school period of the year we had the cooperation of the teachers in carrying on the treatment of children. Our surveys were conducted once a month, starting with September, 1930, and ending with August, 1931. The results are tabulated below.

CONSOLIDATED REPORT ON THE FIVE VILLAGES BY MONTHS

(Adults and Children Combined)

Date	Number Examined	Number Cases Malaria	Malaria Parasite Index	Rainfall in inches Alhajuela (Madden Dam)
September, 1930	289	47	16.2	12.63
October, 1930	339	53	15.6	10.15
November, 1930	290	58	20.0	3.08
December, 1930	300	81	27.0	0.88
January, 1931	433	93	21.5	0.24
February, 1931	398	82	20.6	0.13
March, 1931	513	80	15.6	2.35
April, 1931	529	112	21.1	2.19
May, 1931	463	123	26.5	11.08
June, 1931	398	106	26.6	13.72
July, 1931	425	86	20.2	12.81
August, 1931	420	116	27.8	9.06
Twelve months totals	4797	1037	21.6	78.32

The mean temperature record for the Pacific Section of the Canal Zone for the year 1930 was 87.8 degrees, and for the Atlantic Section 86.3 degrees. Since the Chagres River locations are midway between the two oceans and are only fifteen feet above the surface of Gatun Lake, it may be taken for granted that the temperature is about the same as those recorded for the Balboa Heights and Cristobal stations. Note the wide variation in the number presenting themselves for examination at each survey. School periods, planting and harvesting time have something to do with these variations.

The parasite index for each month does not parallel the monthly rainfall, since it is fairly steady throughout the year.

The following tables will compare the parasite rates of the initial surveys when no treatment was available with the average monthly parasite rate during the year when voluntary free quinine treatment was in effect.

NEW SAN JUAN

(On banks of the Gatuncillo)

Children vs. Adults	Number Examined	Number Positive Malaria	The Malaria Rate
Primary survey children. No treatment	88	52	59.1
Av. of 12 surveys for children. Voluntary treatment	71	16	22.5
Primary survey adults. No treatment	141	43	30.5
Av. of 12 surveys for adults. Voluntary treatment	61	8	13.1

GATUNCILLO

(At the junction of the Chagres and Gatuncillo Rivers)

Children vs. Adults	Number Examined	Number Positive Malaria	The Malaria Rate
Primary survey children. No treatment	34	14	41.1
Av. of 12 surveys of children. Voluntary treatment	28	9	32.1
Primary survey adults. No treatment	26	4	15.3
Av. of 12 surveys of adults. Voluntary treatment	24	5	21.0

GUAYABALITO

(On the banks of the Chagres)

Children vs. Adults	Number Examined	Number Positive Malaria	The Malaria Rate
Primary survey children. No treatment	52	32	55.1
Av. 12 surveys of children. Voluntary treatment	49	13	26.5
Primary survey adults. No treatment	58	27	46.5
Av. of 12 surveys adults. Voluntary treatment	32	7	21.9

SANTA ROSA

(On the banks of the Chagres)

Children vs. Adults	Number Examined	Number Positive Malaria	The Malaria Rate
Primary survey children. No treatment	63	38	60.3
Av. of 12 surveys of children. Voluntary treatment	61	16	26.2
Primary survey adults. No treatment	84	39	46.4
Av. of 12 surveys of adults. Voluntary treatment	36	5	13.9

LAS GUACAS

(On the banks of the Chagres. Almost surrounded by water)

Children vs. Adults	Number Examined	Number Positive Malaria	The Malaria Rate
Primary survey children. No treatment	23	11	47.8
Av. of 12 surveys children. Voluntary treatment	17	4	23.5
Primary survey of adults. No treatment	30	13	43.3
Av. of 12 surveys adults. Voluntary treatment	20	3	15.0

CONSOLIDATED VILLAGES

Primary Surveys. No treatment in use

Children vs. Adults	Number Examined	Number Positive Malaria	The Malaria Rate
Children	260	147	56.5
Adults	339	126	37.2
Totals	599	273	45.6

CONSOLIDATED VILLAGES

Average of 12 Monthly Surveys. Treatment in use

Children vs. Adults	Number Examined	Number Positive Malaria	The Malaria Rate
Children	226	58	25.6
Adults	173	28	16.2
Totals	399	86	21.6

The following table shows the effect of screened camp quarters and the compulsory use of quinine for those positive for malaria. These labor units are located in the same general area as the villages.

RURAL LABOR UNITS

The Panama Canal

Av. of 6 Thatcher Highway Surveys Av. of 14 Madden Dam Surveys	Number Examined	Number Positive Malaria	The Malaria Rate
Thatcher Highway forces	244	9	3.7
Madden Dam and road forces	272	14	5.1
Totals	516	23	4.4

SPECIES MALARIA PARASITES

(Found in 12 Village Surveys)

Date	P. falciparum	P. vivax	P. malariae	Mixed	Total
September, 1930	18	23	2	4	47
October, 1930	25	23	5	0	53
November, 1930	37	13	8	0	58
December, 1930	36	42	2	1	81
January, 1931	42	41	9	1	93
February, 1931	64	17	1	0	32
March, 1931	54	21	3	2	80
April, 1931	80	18	11	3	112
May, 1931	97	20	4	2	123
June, 1931	83	18	5	0	106
July, 1931	73	8	5	0	86
August, 1931	92	20	4	0	116
Total	701	264	59	13	1037

This shows an incidence of species as follows:

P. falciparum	67.6 per cent
P. vivax	25.4 per cent
P. malariae	5.7 per cent
Mixed	1.2 per cent

We have established the gamete rate on the species *P. falciparum*, since the gamete of this species is more easily and surely detected by the various technicians, and it is our most common form of malaria.

INCIDENCE OF P. FALCIPARUM CRESCENTS

Monthly Surveys

Date	P. falciparum Cases	Number of Crescent Carriers	Monthly Rate of Crescent Carriers	Good Infector Types of Crescent Carriers
September, 1930	22	10	45.4	5
October, 1930	25	10	40.0	6
November, 1930	37	4	10.8	3
December, 1930	37	2	5.4	2
January, 1931	43	6	13.9	4
February, 1931	64	14	21.8	9
March, 1931	56	23	41.0	9
April, 1931	83	24	28.9	7
May, 1931	99	21	21.2	6
June, 1931	83	14	16.8	4
July, 1931	73	14	19.1	2
August, 1931	92	22	23.9	8
Total	714	164	22.9	65 (39.6%)
Primary survey	160	51	31.8	8 (15.7%)

INCIDENCE OF MALARIAL INFECTIONS OF HOSPITAL INTENSITY TYPE

Date	Las Guacas	Santa Rosa	Guayabalito	Gatuncillo	New San Juan	Totals
September, 1930	1	4	0	2	1	8
October, 1930	0	6	0	4	4	14
November, 1930	0	3	4	3	3	13
December, 1930	0	1	0	1	1	3
January, 1931	2	3	3	2	6	16
February, 1931	1	0	2	0	5	8
March, 1931	0	5	1	5	5	16
April, 1931	0	5	7	5	9	26
May, 1931	0	7	5	1	5	18
June, 1931	2	6	3	2	8	21
July, 1931	1	4	0	2	6	13
August, 1931	1	3	6	3	4	17
Totals	8	47	31	30	57	173

These cases were not sent to any hospitals or dispensaries for treatment, but they represent the intensity of infection that usually does require hospitalization. These people have a decided negroid blend and their tolerance is high. It very seldom happens that anyone dies as a result of a malarial attack in these villages, but they are below par for any sustained daily physical effort, and form a seed bed for the propagation of the disease.

The twelve monthly blood film surveys revealed 1,037 persons that were positive for malaria parasites, and 173 of them, or 16.6 per cent, were of the type usually requiring treatment in a hospital. The initial survey of the five villages yielded 273 persons showing parasites, 48 of them with severe infections, or 17.5 per cent.

It is impossible for us to know how many of these cases of malaria found in field surveys are newly acquired infections, and how many represent relapse. We certainly feel that relapse forms the bulk of each village index. In order to gain a little light on the question of exposure in such locations and the period of time the average individual might live in such surroundings before acquiring malaria, we have made it a rule to examine all babies. We have collected our records on the babies examined in these five villages and in several other locations similar to them. The results are tabulated below.

BABY SURVEY

Rural Villages and Farm Houses

Ages	Number Examined	Number Positive For Malaria
1 month or less	6	0
1 to 2 months	7	0
2 to 3 months	13	3
3 to 4 months	16	3
4 to 5 months	7	0
5 to 6 months	11	5
6 to 7 months	17	5
7 to 8 months	16	2
8 to 9 months	9	6
9 to 10 months	11	0
10 to 11 months	12	6
11 to 12 months	95	20
Total	220	50

During the first six months of life the parasite index was 18.3 per cent, and in the second six months it was 24.4 per cent. No parasites were found in the thirteen babies that were two months or less of age.

The 50 out of 220 babies gives a parasite rate of 22.7 per cent, and that is about what the average consolidated village rate is for total inhabitants.

SPECIES OF PARASITES FOUND IN THE BABIES

Species of Parasite	Number of Cases	Species Incidence	Species Incidence in Total Inhabitants of the Five Villages
P. falciparum	33	66.0	67.6
P. vivax	15	30.0	25.4
P. malariae	1	2.0	5.7
Mixed infection	1	2.0	1.2

MALARIA RATES IN PERMANENT INHABITANTS

During the course of the monthly surveys, many individuals were examined only once, being casuals in the town, friends or relatives of the inhabitants. These casuals swelled the total numbers of those surveyed and contributed their portion to the malaria rate. To offset any influence they may have had, and to determine

the effect of house location and other factors on "family malaria," another compilation of the individuals and rates in the surveys was made, using as a base an official census made in May, 1931, during a hookworm campaign. In this census all houses, with their occupants, were enumerated in each town. From these records it was possible to discover the place of residence and the relationships of the inhabitants. The results for the five towns show the difficulties in the way of any treatment campaign which may be instituted in the future. In all, 772 persons listed in the census were examined at least once during the course of the surveys. Of these, 417, or 54.0 per cent, showed the presence of malaria. That this is not the true incidence of the disease is shown by the percentage positive found in those examined 8 to 13 times. There were 181 individuals so examined, of whom 153, or 84.5 per cent, were positive. Very few persons were examined 12 successive times at monthly intervals; 32 so examined showed 27 positive, or 84.4 per cent. Of those 13 persons examined in the original survey and at every successive survey, 12, or 92.3 per cent, were positive. No doubt this per cent could be increased by greater frequency or by longer periods of examination. That the rate of 54.0 per cent found in the surveys was too low is shown by the fact that over two-thirds of those surveyed (68.0 per cent) were examined 6 times or less. Fifty per cent were examined 4 times or less. An interesting relation between number of persons and of malaria cases in a house is present. Thus, in Guayabalito only a quarter of those who live by themselves have malaria, while of those living in dwellings housing seven persons, 85.7 per cent have malaria. This is no doubt in part explained by the fact that those living alone are older persons, while the large families contain many children, whose rate is always high. It is impossible to give the exact average age of those living alone, to compare with the age of the adults living with large families, but five of six adults who lived with large families had malaria, while only two of eight living alone contracted the disease. An important factor bearing on this phase is the increased attraction for Anopheles of a house full of small children, as against the small attraction of a single inhabitant.

GUAYABALITO

Relations of number of persons in house and number of cases of malaria in each house.

No. in House	1	2	3	4	5	6	7
Number of houses	8	6	9	7	8	2	3
Possible cases of malaria	8	12	27	28	40	12	21
No. actually positive	2	6	18	16	29	2	18
Percentage having malaria	25	50	66.6	57	72.5	16.6	85.7

LAS GUACAS

No. of houses	8	7	6	2	3	1
Possible malaria	8	14	18	8	15	6
Actual malaria	3	6	10	6	7	5
Percentage having malaria	37.5	43.0	55.5	75.0	46.6	83.3

Because of incomplete data it was impossible to tabulate similar information for the remaining three towns.

SUMMARY

(1) Five primitive river bank villages located in the mid-basin of the Chagres have been observed for one year. Thick blood film surveys were conducted once each month. Those found positive were placed on voluntary treatment with free quinine and others who desired quinine between surveys were supplied. The average of 12 monthly surveys shows a reduction of the parasite rate to one-half its primary incidence.

(2) The cooperation of these people, unaccustomed to public health discipline, was far better than we could have expected, although it was by no means all that is required to gain the full benefit of field treatment against the malaria seed bed. Mass treatment under thorough discipline is necessary to bring the parasite index anywhere near the rate of the adults in the screened labor camps of the Panama Canal, a short distance up the river from the villages.

(3) Anopheline mosquito density, in spite of the vast potential breeding areas near by, is not so great as in the inhabited sea coast plains. The Madden Dam will be completed in a few years, and only a small operating personnel will live at the site. Extensive permanent anti-mosquito operations about these contact river villages are therefore not indicated. Screening or mosquito-proofing the native house, as a general measure, will not meet with the approval of these river folk. It therefore becomes an area of great interest if thorough mass treatment can be inaugurated during the coming year with quinine and plasmochin.

(4) Examination of babies during the year showed no positives until the third month of life, but the general rate up to 12 months of age was about the same as the combined rates for the villages. Successive monthly surveys for a year on the other inhabitants indicate that nearly all of them reveal parasites at some time during the year. New infections therefore appear to play a less important role in maintaining the village index than relapse.

(5) Carriers harboring sufficient gametocytes to be good infectors for the mosquito are rare. The incidence of this type of carrier among those who revealed estivo-autumnal crescents was 15.7 per cent before voluntary quinine started, and during the period of treatment it was 39.6 per cent.

(6) Severe infections were not very infrequent, but none of them desired to have hospital treatment, and their stay in quarters was very brief.

(7) The monthly incidence of malaria as revealed by the blood film survey showed almost no tendency to follow the curve in rainfall.

(8) The house or family incidence of malaria appears to depend more on the number and character of the people in a given house than upon the character and location of the house. A large family will form a greater attraction for the Anopheles mosquito than a single individual in a house.

Seven hundred and seventy-two permanent inhabitants of the five river villages examined at least once each gave a rate of 54.0 per cent. One hundred and eighty-one permanent inhabitants examined at least eight times gave a rate of 92.3 per cent, showing that presumably the entire population at one time or another during its lifetime becomes infected with malaria.

THERAPY OF CHRONIC MALARIAL SPLENOMEGALY*

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The phenomenon of contraction of the spleen following the administration of suprarenalin, in addition to having diagnostic application, has also been the subject of therapeutic tests conducted by Peserico (1929), Izar (1929), and Starnotti (1930). The results obtained by these workers have, however, not been wholly satisfactory.

Peserico, using subcutaneous injections of 0.5 milligram of suprarenalin repeated every four hours for about fifteen days, succeeded in one case only in bringing about a reduction in the swelling of the spleen and in curing the anemia. The case was one of pernicious splenomegaly during pregnancy. Starnotti, employing daily subcutaneous injections of adrenalin in various kinds of splenomegaly, found that after a certain number of contractions had been produced the spleen no longer responded to the stimuli. In this connection we might recall the practice of treating malarial infections by a combination of suprarenalin and quinine for the purpose of setting into circulation the parasites lodged in the spleen.

With the technic heretofore in use, the amount of suprarenalin administered is relatively large, and it must be considered that only a fraction of the drug so given is useful for the end in view. If the purpose to be achieved cannot be accomplished in the designated way, the organ should be approached more directly, that is, by intravenous inoculations. The direct method is in accordance with the practice already followed in our clinic for other conditions, as for example, the intratracheal injection of gold preparations in pulmonary tuberculosis, the use of suprarenalin in hemoptyses (Giuffrida) and of emetin rectally in amebic hepatitis (Pappalardo).

The field of splenomegaly is a large one, diverse in etiology, anatomical conditions, and terminology. We have, therefore, limited our investigations solely to the enlargement of the spleen found in malaria.

A series of patients with chronic malarial splenomegaly, in whom the splenomegaly had resisted the usual quinine-arsenical treatments, were injected intravenously during the afebrile stage with minimal doses of suprarenalin. The patients remained free from circulatory and renal disturbances. Of particular importance is the fact that the doses of suprarenalin used by us were small, beginning with 0.01 milligram, gradually increasing to 0.1, and finally reaching a total of 2, 3, and rarely 4 milligrams. By the subcutaneous method, the equivalent dose of the drug (in the proportion of 1:100 usually adopted by pharmacologists) would amount to the large quantity of 200, 300, or 400 milligrams.

The action of the drug may be said to be immediate, the resulting symptoms being pallor, headache, tremors, sometimes psychic and motor excitation, and palpitation. The injections as a rule are given daily or on alternative days if the patient's general reaction is intense, the dosage being increased by 0.01 milligram until the total quantity as above indicated is reached. The final dose of 0.1 milligram (seldom 0.2) is repeated about twenty or thirty times until the swelling of the spleen disappears or becomes negligible, which generally happens in about two months. We again desire to draw attention to the fact that the patients had no febrile attacks during treatment and in the course of the administrations were not subjected to any other form of treatment.

The rhythm and mode of spleen regression varied from case to case. In general it may be said that every contraction was followed by a limited expansion, and the reduction was greater in proportion as the doses of the drug were increased.

The following cases responded in the shortest periods of time:

Case 1.—I. C., age 25, had had malaria for about seven years, during which time he had always been subject to attacks of fever in the summer, which were treated with quinine. The last attack occurred a month before admission to the clinic. He had already been afebrile for 15 days, and this state was maintained during the entire stay in the hospital. The spleen was found to be large, firm, reaching to the iliac and anteriorly to the xiphoid-umbilical lines.

Thirty-two suprarenalin injections were given in a period of 45 days (total 3 milligrams). The spleen wholly regained its physiological limits.

BLOOD COUNT

	On Admission	On Departure
Erythrocytes	2,000,000	4,600,000
Leucocytes	3,000	5,900
Hemoglobin (Sahli)	70	90

Case 2.—P. R., age 35, attacked by malaria three years previously, has had no febrile attacks for a year; latterly has noticed pallor, weakness, marked emaciation and swelling of the lower extremities, for which admission to the clinic was sought.

The subject was noticably ill, having an earthy yellow color, swelling of the lower extremities, a firm

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spleen, reaching from the costal margin to beyond the umbilical line and medially to the parasternal line.

After a short period of observation he was subjected to suprarenalin treatment. With 40 injections (total 3.5 milligrams) subdivided over a period of 60 days, a complete reduction of the marked splenic swelling was effected.

BLOOD COUNT

	On Admission	On Departure
Erythrocytes	625,000	4,000,000
Leucocytes	3,000	4,500
Hemoglobin (Sahli)	40	80

Case 3.—C. F., age 35, had contracted malaria about four years previously. The subject, deficient mentally, was unable to give exact information as to the course of the disease. He had received quinine treatments.

The expression was apathetic, color pallid, state of nutrition fair, spleen hard, enlarged and palpable below to about four fingers' breadth from the costal margin and anteriorly at the perpendicular bisecting line of the clavicle.

After 40 injections (total 3.5 milligrams) given during the course of two months, the treatment was found not to have brought about any reduction of the size of the viscus.

BLOOD COUNT

	On Admission	On Departure
Erythrocytes	1,500,000	2,000,000
Leucocytes	3,800	4,000
Hemoglobin (Sahli)	80	80

Case 4.—In G. L., age 26, the disease manifested itself fourteen years ago. Every year during the estivo-autumnal season he has been subject to relapses, treated with quinine, to which they have yielded. Before entering the clinic he had been afebrile for some time.

His nutrition was poor. A large spleen reached below the umbilicus transversely, medially to the perpendicular bisecting line of the clavicle.

After the usual period of observation, 30 injections (total 2.5 milligrams) were given in a period of 38 days, and the spleen was reduced to about two-thirds of its former size.

BLOOD COUNT

	On Admission	On Departure
Erythrocytes	1,700,000	3,000,000
Leucocytes	5,000	5,000
Hemoglobin (Sahli)	70	80

Case 5.—G. R., age 42, had the first attack of malaria about twelve years previously and several relapses thereafter. He was treated with quinine and arsenical preparations. He had been afebrile for about seven months. During this time he was conscious of fatigue, had an earthy yellow color, for which reasons he applied for treatment to the clinic.

He was pallid in color, the sclerotic coat of the eye was somewhat jaundiced, the spleen hard, reaching about four finger breadths beyond the costal margin and palpable anteriorly at the parasternal line.

In this case the treatment could not be completed, the patient being removed from the clinic for personal reasons. Nevertheless, the spleen was reduced more than half after 20 injections (total 1.5 milligrams).

BLOOD COUNT

	On Admission	On Departure
Erythrocytes	900,000	2,000,000
Leucocytes	1,600	3,000
Hemoglobin (Sahli)	50	70

Case 6.—T. P., age 36, contracted malaria in Albania sixteen years ago. He had recurrences every summer; treated with quinine. For three years he had noticed a progressive deterioration with pains in the left hypochondrium, fatigue, and pallor.

The spleen was firm, reached the umbilicus transversely and medially the perpendicular bisecting line of the clavicle.

In the space of two months he received 40 injections (total 3.5 milligrams). The spleen, after being reduced by about two-thirds of its size, remained stationary.

BLOOD COUNT

	On Admission	On Departure
Erythrocytes	4,200,000	4,300,000
Leucocytes	4,000	4,000
Hemoglobin (Sahli)	70	70

An analysis of the results obtained in the various cases shows that the most successful outcome, with disappearance of a marked splenomegaly, was achieved in *Cases 1* and *2*, which were of relatively recent standing (seven and three years, respectively), while in three of the remaining cases, a variable, though definite, reduction of the spleen was effected. One case proved refractory to treatment. Because of the mental condition of the patient, the date of beginning of the illness could not be ascertained.

In general it appears that as much reduction of the spleen was obtained as was possible with the degree of permanent sclerosis present in the viscus.

We have observed that the intravenous suprarenalin treatment (without the aid of any auxiliary treatment), in reducing the splenomegaly, has led also to a parallel improvement of the blood picture. In other words, the suprarenalin treatment has had a beneficent effect upon the anemia of malaria. The fact that this improvement took place in direct correlation with modification of the size of the spleen, showing a maximum effect when the reduction was complete and no effect when there was no reduction, indicates that its mode of action may be the suppression of factors inducing anemia. Such factors may be either a blood destroying agent or an inhibiting component of medullary hemopoiesis, or a latent afebrile hemolysis of parasitic origin.

As has already been stated, the treatment requires minimal doses of suprarenalin, from 2 to 4 milligrams. When one reflects that only a fraction of the drug is able to act on the spleen, the relationship between the minimal quantity used and the complete disappearance, in favorable cases, of the extensive splenic swelling, becomes still more impressive.

The present research begun over a year ago is being continued at our clinic as opportunity offers. In view of the practical importance of the subject, we present at this time this limited number of selected cases of malarial splenomegaly treated with suprarenalin in the hope that confirmation of our results may be achieved with a larger series.

SUMMARY

The authors have treated with minimal doses of suprarenalin, administered intravenously, a series of cases

of malarial splenomegaly. They have obtained total or partial reduction in the size of the spleen, paralleled by an improvement in the blood picture.

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MALARIA CONTROL WORK IN WEST AFRICA*

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In this paper I deal only with the coast region of West Africa and particularly with Nigeria, Liberia and Sierra Leone, localities of which I have some first-hand knowledge.

The portion of the coast region situated between the Senegal and Congo Rivers is perhaps the most malarious in the world. Antimalaria measures meet there with special difficulties: the negro populations are little inclined to health measures of any kind; the temperature is everywhere tropical; the rainfall, almost continuous in some localities, as Cape Palmas, is in all places sufficient to provide mosquito breeding waters over long periods of the year; Anopheles are abundant, particularly the species *costalis* and *funestus*, both of which are domestic in their habits and very susceptible to malaria.

Of these species *costalis* is the most formidable. It is very adaptive as regards breeding places, developing in the sun or in the shade, in fresh or brackish water, in temporary rain puddles or in huge lakes and swamps. It may, under favorable conditions, develop from egg to adult in seven days. It bites freely during the first day of adult life and prefers man for its blood supply. In some cases nine days suffice for the maturation of malignant tertian sporozoites in the mosquito stomach and for their appearance in the salivary glands. Among about 15,000 dissections of *costalis* collected in native houses of Southern Nigeria we found an average sporozoite rate of over 6.5 per cent.

In addition to *costalis* and *funestus* there are at least five other anopheline species found infected in nature or incriminated in the laboratory; of these *hargreavesi* and *nili*, at least, are of sanitary importance.

As the result of these conditions we have an African population practically saturated with malaria. The blood parasite rate of younger school children is usually about 90 per cent. We found a parasite rate of 45 per cent among infants three to four months old in a city little varying from the average as regards the degree of malaria danger. Probably few children escape infection during the first year of life. On a plantation in Liberia we found an adult parasite rate of about 80 per cent.

The difficulties of applying antimalaria measures in such a region are readily appreciated. For many years, possibly for many generations to come, we cannot expect to cope with malaria among Africans over any wide area of the country. In certain smaller areas where white control is more effective and where natural conditions favor, the outlook is more promising. These areas are principally cities, which, in West Africa, enjoy little or no immunity from malaria by virtue of density of population alone. In some cities effective malaria control work has already been done. I mention in particular Lagos, Nigeria, and Freetown, Sierra Leone, localities in which I have assisted in surveys of the human and mosquito populations.

In Lagos the measures employed by the local sanitary authorities have been chiefly drainage, filling and larvicides, the last consisting of oil and Paris green; in Freetown, chiefly drainage and larvicides, the drainage including the training and canalization of streams flowing through the city. Lagos has the natural advantages of a pervious soil and the protection of a lagoon separating by half a mile much of the city from large breeding places. Freetown is situated on a steep hillside where natural drainage is good. Both cities have well organized sanitary departments.

These measures have resulted in a diminution of Anopheles and of the mosquito nuisance in general. I spent two weeks in an unscreened hotel in Freetown without noting a single mosquito in my room. This was at the end of the dry season. A few weeks later I might have been less fortunate. The malaria danger has certainly been reduced. Anopheles are comparatively few in native houses in both cities. Infected *costalis*, however, are still present and the blood parasite rate of children, even of young infants, is still very high. In both localities *costalis* continues to breed in small collections of water, and in Lagos we have good evidence that this species comes in from neighboring coastal swamps situated a half a mile or so across the lagoon. But something definite has been accomplished in the face of great difficulties, and the results in both cities encourage further efforts.

During the dry season of 1930 two of us tested the efficiency of larvicides alone in an area surrounding the station of the Rockefeller Foundation for the study of yellow-fever. This station, "The Yellow-Fever Compound," is situated in Yaba, some seven miles from Lagos. By means of oil and Paris green we effectually controlled the breeding of Anopheles in an area of one-half mile radius and extended our treatment about one mile to windward. Outside of the half-mile radius are situated some large wooded swamps, little, if at all, productive of *costalis*. The amount of production of this species within a mile radius of the station was probably negligible.

As a test of the efficiency of our work, we took the numbers and rate of infection of *costalis* collected in

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certain native houses in the station. The experiment was continued over a period of about three months. We found that Paris green had to be applied every five days and oil every eight days because of the rapid development of *costalis* in that warm climate and season.

Our results were hardly brilliant. The numbers of *costalis* diminished, it is true, but remained as great as during the dry season of the following year when no larvicidal work was done. The sporozoite rate remained at or above the yearly average. The malaria danger, then, was not materially reduced. It seemed likely that *costalis* were coming in from a large untreated coastal swamp situated about a mile from the station. The appearance in collections at Yaba of a peculiar type of this species would strengthen this supposition, a type commonly, if not exclusively, bred in coastal swamps in this region. It seems, then, that malaria control work in West Africa must take into account a wide dispersion range of *costalis*. Some staining experiments which we did in Liberia indicate that this species will range at least half a mile, even where long flights are not made necessary by a lack of convenient blood supply or of places to lay eggs.

We were materially aided in our "control" work by the dry season which did away with most of the breeding except in small ponds. During the rainy season many acres of water formed within the half-mile radius, veritable lakes and innumerable puddles, all productive of anopheline larvae.

On the whole, the function of larvicides in West Africa would seem to be that of adjuvants to drainage and filling. We found little encouragement for extended larvicidal campaigns. With the means at present at our disposal, the most hope lies in the protection of limited areas and that by the abolition of breeding waters.

I have thus far discussed only antilarval activities. I will mention briefly some other antimalaria measures:

Quinine as a preventive of malaria is widely used in West Africa chiefly in the form of five-grain daily doses. It is generally recognized by physicians there that this drug is not a true prophylactic. It does not destroy sporozoites. But the opinion is general that these small daily doses prevent more serious manifestations of malaria, particularly blackwater fever. This opinion, however, is not universal; one can find physicians in Africa who do not recommend this "preventive" treatment, but defer medication until symptoms of malaria appear. The use of plasmochin as a prophylactic is yet to be tested on a large scale there.

Screening is not likely to become general in West Africa. Few white people except Americans use it extensively; and it will be many years before Africans employ this measure on any effective scale. It is a most valuable antimalaria measure in Africa or elsewhere to those who will use it.

Education.—African children take to education as a duck to water, and health education is likely to prove of much value.

Domestic animals are rarely housed and consist mainly of goats, pigs, and chickens. Human beings are the preferred hosts of Anopheles, a fact proved by direct observation and by numerous precipitin tests of the blood meal of *costalis* and other species.

Whatever measures are applied in this region, spectacular results are not to be expected. The campaign will be a long one at best. But something definite has been accomplished and the future promises more.

DISCUSSION (*Abstract*)

Dr. Henry Hanson, Jacksonville, Fla.—I was in West Africa from November, 1925, until May, 1927. During the first part of my stay I devoted very little time to the study of the control of malaria. My official assignment was a study of endemicity of yellow-fever in the Ibadan area.

Dr. Barber's paper is a most interesting and valuable presentation of what appeared to be one of the greatest health hazards in Nigeria. The question of quinine control merits some discussion. The British as well as most of the Europeans who did their "tours" whether as officials or traders appeared to be firm believers in the efficacy of the daily dose of five grains of quinine, taken either at noon or with the evening meal. Aboard the ship on which I went out I noted that the "old timers" began taking quinine about the same time that they began wearing their sun helmets, and this appeared to be on approaching Freetown in Sierra Leone. This practice was continued until on the return journey they were approaching the European port. I began taking quinine immediately after reaching Lagos (November, 1925) and continued quite regularly until about June, 1926, when I became careless to some extent on account of being in a region where the *Anopheles costalis* did not appear abundant. About the beginning of the fourth week of June I did not feel well, and about June 26 I went to bed with a fairly severe attack of a falciparum infection, with both rings and cresents showing in the blood. The colonial medical officers appeared to believe in the efficacy of quinine control. Living as we did in unscreened houses, there was little chance to escape being bitten. Many of the British objected to the screens because they obstructed the breeze.

There is little one can add to the extensive observations reported by Dr. Barber. I took a small number of smears from young native children, ranging in age from four weeks to ten years, in which I obtained 80 per cent positives by the thin smear method. The very heavy infections in most of the smears were notable, and in several of these phagocytosis of infected red cells were observed. The natives did not appear to take any precautions against infection and the adults did not appear to have nearly the same degree of active malaria as the children. The finding of phagocytosis of the infected red cells suggested a process of immunization to account for the lessened amount of malaria among the adults. How extensive the disease is can only be judged by studies like those presented by Dr. Barber, since statistics either of mortality or morbidity are almost totally lacking. The country is too extensive and the white population of about five thousand among eighteen million blacks is too small to

cope with the enormous sanitary problem of Nigeria. Potentially the country is rich, and the British Colonial, as fine a type of man as one ever meets, is doing as much as could be expected under the circumstances. The mosquito bar, mosquito boots, and the daily dose of quinine seemed to be the main instruments of control when I was in West Africa, and such precautions were limited to the foreign whites.

MALARIA CONTROL AND ANOPHELES CONTROL MEASURES OF THE PAST AND FUTURE*

By J. A. LEPRINCE,†
Memphis, Tenn.

It is very easy for most of us to forget that our first means of combating malaria fever was devised by the natives of South America long before the days of Columbus. Also, it is not generally known that America's malaria field workers learned at Panama from the Panamaians that the bark of certain trees can be advantageously used as efficient anopheline larvicides. So far as treatment of malaria is concerned, we of today have not yet any satisfactory substitute for that which originated in Peru.

In colonial days in Georgia, a strong effort was made to eliminate malaria in Savannah by legislation, by prohibiting the culture of rice near the town and paying the land owners for loss of potential profits.

In the other colonies we built large numbers of small constant level mill ponds, and thus caused more new cases of malaria than were cured by the use of Peruvian bark.

It is stated that the colonists used other remedies than quinine for malaria attacks, but we have no record as to whether any of them were effective.

The war of 1860 to 1865 was the indirect cause of widespread distribution of malaria all over our country, and especially so in the Northern states, where thousands of new carriers settled.

The effective start of Anopheles control, and therefore of malaria control, in America was originated by Dr. L. O. Howard, our Honorary Chairman, before any of us knew that malaria was a mosquito-borne disease. In his book, "Mosquitoes," published in 1901, he states:

"In 1867, the writer used kerosene in a watering trough at Ithaca, N. Y., and found that mosquito larvae were killed by it; and in 1892 I conducted an experiment upon a larger scale in the Catskill Mountains, indicating the quantity of kerosene necessary for a given water surface and showing that adult mosquitoes were captured by a kerosone film, etc., etc."

He distinctly pointed out that oil had been previously used in London in 1812.

This gave us a means of mosquito control that is yet the basis of most American mosquito control activities.

Also, when Dr. Howard published his book in 1901, he referred to the use of the electric current as a means of destroying adult Anopheles. On page 15, we find the following:

"Recently, Mr. A. DeP. Weaver, an electrical engineer of Jackson, Mississippi, wrote me that while engaged in some experiments in harmonic telegraphy, in which a musical note of a certain pitch was produced by electric means, he was amazed to find that when the note was raised to a certain number of vibrations per second, all mosquitoes, not only in the room where the apparatus was, but also from other parts and from outside, would congregate near the apparatus and would be precipitated from the air with astonishing force, striking their bodies against the apparatus.

"He states that he therefore covered a large surface with sticky fly paper and, after sounding the note for a few seconds, captured all the mosquitoes in the vicinity.

"He then devised an apparatus to electrocute them. A section of wire window screen with paint removed was mounted on a board and small pins were driven between the meshes, the heads coming flush with the surface of the screen. All the pins were connected together electrically, the whole forming one electrode of the secondary coil of an induction coil, while the wire screen formed the other electrode.

"An alternating current of high potential was then passed and when the note was sounded the insects precipitated themselves against the screen and were electrocuted.

"Mr. Weaver, unfortunately, does not state whether males only were captured in this way. His letter was an extremely interesting one and surely his sticky fly paper experiment suggests that further experimentation in this direction would be worth while."

The discoveries of Sir Ronald Ross apparently had very little effect in starting malaria control activities in the United States, although at that time high malaria prevalence was common in large areas of many states.

The Spanish-American War was followed by Dr. Gorgas' campaign against yellow-fever and a part of the appropriation for that campaign was used by the writer, with Dr. Gorgas' approval, to see what could be done near Havana toward malaria control. Sufficient was learned from this campaign to indicate what could be done at Panama in case it should be decided to build a canal there.

The campaign in Cuba and Panama indicated clearly what might be accomplished in the malarious portions of our country, but no effective action was taken until Dr. H. R. Carter returned from Panama and started malaria investigational studies and control demonstrations in 1913.

One of the first big tasks was to convince and sell to the state health departments the idea that malaria

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control was practical, that it should be undertaken, and to indicate how it should be developed. That task was accomplished.

OUR PRESENT METHODS OF CONTROL

The general public of most of our communities, including rural communities, desires mosquito freedom, and proves it to us each year by spending millions of dollars for metallic mosquito screen to protect its homes. Many of our county health departments do not fully realize that this public attitude can and should be so developed as to create a stronger public sentiment for applied rural sanitation as well as to eliminate typhoid, other insect-borne diseases and malaria.

In some counties, where there are school districts with very high malaria rates, the directors of the full-time health units appear to take relatively little interest in malaria control, while others take none. Some full-time health units are doing very good work along this line.

It is somewhat astonishing to note to what a limited extent the use of Paris green is being encouraged by full-time county health units here, while in other countries its use is being extended most rapidly.

At our last convention the possibilities of using county prison labor for Anopheles drainage activities was stressed and we are not yet using as much of this labor as is available.

Evidently, we have much to learn relative to selling to the public the idea of the advisability and wisdom of rural districts' undertaking malaria control activities. The East Texas Chamber of Commerce, which includes 71 town and city chambers of commerce, has recently been competing with us along this line and achieved results by obtaining a state appropriation of fifty thousand ($50,000) dollars for a period of two years. There is no reason why such activity and progress should be confined to one state, and it is evidently worth while for health workers to study and learn how to get active support from associations of business interests. It is the writer's opinion that a time effort, having a value of one hundred thousand ($100,000) dollars could be advantageously used by state and county health departments along this line, and that it would rapidly bring practical results that we only hope for at the present time, although it has long been and yet is within reach of achievement if gone at in a proper manner.

The United States Public Health Service for a number of years made intensive studies of impounded water development projects, with a view of determining suitable methods for preventing their becoming prolific sources of Anopheles and epidemic outbreaks of malaria. Since then, a number of states have based their state regulations for mosquito control of impounded waters on these studies. In recent years, the sanitary work of a number of companies constructing such projects is carried out both with and without state supervision on a far higher plain than the regulations call for. In view of the fact that control of Anopheles could be obtained on these lakes by using aquaplanes for Paris green treatment at possibly from 6 to 10 per cent of the cost of present operations, it is thought that impounding water agencies should be encouraged and permitted by state boards of health to use such procedure.

It is evident that at present the cost of screening of rural farm tenant homes is reasonable, but a less costly procedure is very desirable and should be achieved. Also, it is self-evident that many field workers do not realize the importance of screening as a means of reducing insect-borne diseases other than malaria, and insufficient effort is being used in this direction.

There is a general agreement that we can best accomplish the desired end in malaria elimination or malaria control through the full-time county health units, assuming that such units will attack their problem vigorously in the field rather than giving it only a verbal attack. Such units will find it decidedly advantageous to determine what percentage of the rural public know and understand their personal relation to the malaria problem and also what the malaria control activity and its ramifications are for. At present, most of them are merely guessing at it.

In some counties the medical profession is doing splendid work by advising the families of their rural patients as to what the farmer can and should do toward malaria control, but our county health directors have not yet developed the full possibilities of this line of attack.

There appears to be considerable difference of opinion yet as to the value of blood slides in connection with practical field work, and apparently it will be well worth while for one of our sub-committees to devise and make popular a better method of procedure (or a pre-treatment) that will bring the parasites into the blood at the time when the blood sample is taken. It does not matter if it does take several years to make such a study complete.

THE FUTURE MALARIA CONTROL MEASURES

We must cease to be satisfied with our present methods of procedure and devise better, less costly and more rapid ones. And it should be a part of the work of our Association to interest more field workers and more business men in helping us to bring such conditions into existence.

We have not yet worked out any plan for improving the work nor intensifying the interest of sanitary inspectors engaged in malaria control activities. This can and should be done by both state and county health departments.

One condition that should not exist in the malaria belt in the future is to have full-time, well-equipped health units in highly malarious counties so ignoring their malaria problem that malaria is contracted at the court house, where the health unit is located, nor to have numerous gorged Anopheles in and clinging to the building each morning during the malaria season.

Such conditions existed this year and the health unit under consideration thinks it has an all round program of procedure.

In a number of counties at the present time steps are being taken to prevent the sale of 10-mesh and 12-mesh mosquito wire and of screen doors of similar mesh. This practice will soon extend to all states of the Southland. Steps should be taken to reduce the export of such screen cloth to countries to the south of ours.

Among the poorer class of farm tenants in highly malarious counties, there is and will be needed cheaper methods of screening and screen protection. Investigations along this line have already been made by the full-time health unit of Shelby County, Tennessee, and the results are very promising. Also, the City Health Department at Memphis, Tennessee, has recently shown that it is possible to get all property owners to screen all rented negro homes.

With regard to drainage activities, there is no reason why a (county owned) small suitable tractor cannot be available to the health unit for use in connection with a ditching plough on farm lands; and as soon as the demand for minor drainage is sufficiently developed, new small ditching machines to reduce cost will undoubtedly develop. There is no reason why we cannot have a new type of tile drain that will be lighter, cheaper to buy and cheaper to install and less easy to break than the ones now used. With the use of small pumps it will be possible to make sumps in territory where ditch grades are relatively flat and thus eliminate unnecessary use of larvicides. Also, with our present use of Paris green in many cases, our small swamps can be advantageously turned into fish ponds or lakes to advantage.

When state appropriations are considered or available it will be necessary to see that they are not so subdivided by budgeting and by fixed time limits as to interfere with the progress, and the business interests that cooperate must all understand why more can be achieved and better work done by specified flexibility.

The work already achieved through the support of the chambers of commerce of East Texas indicates that it is possible, and practical, to obtain state appropriations and that the rural public can be made to be decidedly interested in malaria elimination.

Two control measures that may be used to advantage in the future are mosquito traps to destroy infected Anopheles and the use of home grown larvicides. We know that waste tobacco stems, tea, (pyrethrum made from chrysanthemum flowers) and bark of mangle trees all have larvicidal properties and as the larvicidal value of hundreds of other plants has not yet been tested we may expect to have several cheap larvicides that are yet unknown.

Merely because oiling by means of knapsack sprayers was found to be suited to conditions at Panama, it does not follow that we should cling to that old practice. In many states we have large sheets of water to treat where mechanical means of oil treatment should be used and improved upon until better control measures can be developed and applied.

In connection with developing a wider public interest in malaria freedom and in mosquito annoyance freedom, we should make it more widely known that whether we happen to notice it or not, in many states we pay a mosquito tax. In some localities, although we do not know it, this tax is in the electric light bill, in others in the cost of cotton production. Again there is a considerable malaria tax involved in farm products raised in our Southern irrigation districts as well as a tax attached in products that come from the coastal plains and river valley districts of the countries to the south of us. Our Committee can be influential in helping to reduce these unseen but large taxes, and I hope the day will soon arrive when the printed proceedings of this Committee will annually reach every county sanitary inspector engaged in mosquito control activities as well as all the technical schools of the southern republics. The Officina Sanitaria Panamericana has already published much information of practical value and it is possible that within a few years we shall be obtaining more new ideas and new methods of malaria control from the southern republics which gave us our first big start in malaria control. It is quite possible that soon our Committee will be an International Malaria Committee in its membership as it already is in spirit.

The outlook for malaria control has never been brighter than at the present time. The developing cooperation of associations of business interests is encouraging, and it should be a part of our work to see that such activity is made to grow, not only all over the Southern states, but to the lands of our friends of the southern republics.

We, as field workers, must be constantly on the *qui vive* for improved methods. We must have cheaper and better methods of ditching and ditch maintenance; in fact, a new ditching machine. We need cheaper tiling, less costly screening of farm tenant homes. We must eliminate the idea of fitting a standard plan onto a changing problem, containing varying conditions, and we must cease to be afraid of hard work and of potential failures.

DISCUSSION (*Abstract*)

Dr. H. G. Tuggle, Memphis, Tenn.—Mr. LePrince forgot to state that it was in our County (Shelby County, Tennessee) that Dr. H. R. Carter started his health activities back in 1878, and we have a press interview in our files in which he describes the way the sanitarians of that day were attacking their mosquito-borne disease.

The present County Commissioners of Shelby County as well as the county health officials are thoroughly awake to the importance of all known insect-borne disease control measures, and not only keep themselves advised as to what we are doing, but also see to it that the taxpayers are getting decidedly full value for each dollar expended for applied rural sanitation. It keeps us on our toes all the time. During the past six

months we have screened 659 homes at a cost of $9.25 per home. These were farm and urban tenant homes. Of course a much larger accomplishment would have been achieved if the present financial stress period had been absent.

We have not yet sold our business interests the idea of the important relation existing between rural applied sanitation and city mercantile prosperity, but have made a good start in that direction and intend to build it up on solid foundations.

Regarding present and future methods of control, we believe there always will be room for improvement and have sent our best inspectors off to school so they may get the same viewpoint. Also we give them intensive training in selling so they can and do get "hard-boiled scoffers" eventually to come across and sign on the dotted line. We can see the need and the extent of the size of the field for improvement in this important matter of practical instruction for inspectors, and feel that our efforts in this direction have given us an enormous return and advise all other county health workers to give this problem the consideration it deserves.

With regard to permanent drainage, our County Commissioners have initiated a plan and started the light concrete bottom lining of flat grade ditches within Anopheles flight range of the County penal farm, which is a $1,500,000 institution located on a 1,400 acre tract of County land.

While of course we know there is plenty of room for improvement in what we are doing, yet we think Shelby County, Tennessee, is steering in the right direction. We know the main reason for the success we have achieved is because our County Commissioners are in close touch with what we are doing and do not refuse reasonable requests for improving the health status of the rural districts.

My message to you is "Be sure to sell applied rural sanitation to those who hold or may hold the purse-strings," and keep them fully advised as to what is going on.

I desire to give you some information that may be of practical use to a few of those present and to many county field malaria workers who unfortunately could not be with us today.

We are successfully collecting and applying in anti-larval work crank case waste oil, which is collected from garages and filling stations at a total cost of less than 2 cents per gallon.

The annual expenditure for oil employed in anti-mosquito activities in Shelby County, Tennessee, prior to installation of storage facilities and collection of waste oil exceeded 50 per cent of the total expenses for all anti-mosquito and anti-malaria activities. Due to this fact and an increase in number and size of the areas in which extensive control work was being done the County Commissioners obtained and installed second-hand metal tanks to provide storage facilities for 74,000 gallons of oil (about 1,500 barrels). The total cost of tanks, elevated supports and foundations for same was less than $1,000.00. The savings effected have amounted to many times the original cost of equipment. Furthermore, this saving has enabled us to do about five times what we were doing at the same total annual cost.

Further to reduce the expenses and expedite the collection of oil, the County Commissioners bought and installed a pump and a power-take-off on a 1½ ton truck which was already equipped with a 350 gallon steel tank.

Several small metal tanks captured by the County Sheriff from illicit distillers have been donated and are being used at the storage plant to facilitate the handling of waste oil.

The oil storage facilities are located at what is known as Turnpike Oil Plant, where it is necessary to maintain steam at all times to heat the oil and to operate a pump which loads the road oils. This convenience enables us to have and operate a steam pump for waste oil at no additional expense to the Health Department. A departure in our storage facilities which enables us to use waste oil without the usual objections, and without adding light oils, is a 15,000 gallon vertical steel tank with a cone shaped bottom, which allows rapid settling and separation by gravity of water, the heavier oils, and other foreign substances which are found objectionable.

The 15,000 gallon settling tank is filled with oil and two or three weeks are allowed for sedimentation, after which time the water and heavy oils are drained from the tank through a discharge pipe connected at the extreme bottom of the cone. Light oils are drained by gravity to all other storage tanks through a connection at the junction of the cone bottom with the side of the tank. Also, trucks which are used in transporting the oil are filled with light oils for spraying from this connection.

This method of sedimentation and separation has been very successful and recently the privilege of using the plant for that purpose was extended to the Memphis Health Department. At this time all oils collected by the City and County (approximately 150,000 gallons annually) are delivered to the County Oil Plant for separation of objectionable substances by the gravity system. This method or plan enables us to obtain a good grade of light oil, which will spread rapidly and evenly on water surfaces and effectively control mosquito breeding.

As Shelby County has had a rapidly growing dairy industry for a number of years, there are many stock ponds that are potential sources of malaria mosquitoes. The County Health Department, with the aid of rural school district health committees, has located and stocked 2,300 ponds, lakes and similar bodies of water with mosquito-destroying top minnows (*Gambusia affinis*). These ponds are now hatchers of mosquito enemies instead of hatcheries of human enemies as they formerly were. Some of the intermittent ponds have been deepened at one location to protect the minnows by preventing complete drying up during an extremely dry season.

After three years' experience in screening and mosquito-proofing rural tenant homes we are fully aware of the fact that further studies along the lines of reducing the cost of screening is highly important if we are to succeed in this direction and have 100 per cent of homes screened. Therefore, we have taken advantage of every opportunity to reduce the cost of manufacturing screen doors. In a city the size of Memphis several tons of scrap galvanized sheet metal accumulates in tin shops and the operators are usually glad to get rid of this waste. When we started to collect this, we found that the shop owners were paying from $1.00

to $1.50 per truck load to have the scrap galvanized sheet iron removed to the City dumps. Since 1929 we have collected and cut into metal triangles for reenforcing the corners of screen doors approximately seven tons of 24 gage galvanized iron which cost us less than $200.00 to collect and cut into triangles and which would have cost us $80.00 a ton, or a total of $560.00, which does not include the cost of cutting into triangles.

Specifications of the United States Public Health Service screen door suitable for rural tenant homes were furnished to local screen door manufacturers with an idea of getting them to manufacture a similar door of especially strong construction at a reasonably low price. The smaller screen door manufacturers were not interested in the project, as they only made up special orders for the better constructed homes at a relatively high price. However, the leading screen door manufacturing concern agreed to build a few doors, which were very satisfactory in every respect, except that they proved to be too expensive for the average tenant home. The screen door manufacturing company established a differential price for doors which was governed according to the size of the door and which made the average price per door $2.55 without the hardware. Making contact with the screen door manufacturers, we have observed that their attitude is to manufacture a door that will sell, and not especially one that will give service. We feel that the screen door manufacturers and the public health workers still have much to learn regarding screen doors and screening.

We have had some experience in building screen doors of wooden furniture crates which accumulate in department and furniture stores. Many tons of this crate lumber come from Northern states each year to the cities of the malaria belt states. It is used for fire wood! We found that the crate material best suited for this purpose is about one inch in thickness and 3 to 5 inches in width. Two types of doors were constructed: the double type door where the materials are double throughout the entire construction, and the single type door where short pieces of wood similar to that used in construction of the door were used to splice on the side rails when it was necessary to join short pieces. Extra strong doors, with all square joints, can thus be constructed (of the double type) 36 inches wide and 105 inches long, or even larger.

Cost of manufacturing screen doors can be further reduced by the installation of power equipment, particularly a power saw which can be bought at a very reasonable cost.

We believe that an efficient way to make salesmen out of sanitary inspectors is to have them go through all the details of screening, even to measuring homes, making and hanging the doors, papering walls and ceiling, and repairing the floor cracks. During the past summer we have conducted a screening and mosquito-proofing school in training six county inspectors and eleven inspectors of the City of Memphis Health Department. Already we have observed considerable improvement in the work these men are promoting.

Working with rural school districts as the unit of operations seems to offer an effective means of arousing interest in matters pertaining to sanitation. For a number of years prizes were awarded at the Mid-South Fair, held in Memphis, to the communities competing in health activities and more particularly mosquito control. We feel that the educational value in mosquito and malaria control alone was worth many times the amount of money given in prizes, to say nothing of the accomplishments which were really worth while.

Coordinated effort between the County Health Department and the County agricultural and home demonstration agents has been a means of securing improvement in rural living conditions. Drainage of areas for agricultural purposes and improvement of premises surrounding homes has been obtained through cooperation with the County Home and Farm Agent. Joint educational programs have been conducted with success in meetings held in each rural school district throughout the entire County with moving pictures, lectures, and so on.

When the County Commissioners of Shelby County, Tennessee, approved of the plan to start a practical school course in applied screening and mosquito-proofing of homes we sent out invitations to other counties and states to send the county unit inspectors for a week's intensive training, but the only persons to appear were malariologists from thirteen foreign countries. They were well impressed with what they saw going on and particularly with those phases of the activities relative to cost reduction.

In addition to the progress already mentioned, we believe our County is a little in advance of many others in the following activities:

(1) The use of live larvicides, that is, the pouring of fish, like pouring of oil, into small Anopheles breeding areas throughout the County as suggested by Dr. L. O. Howard years ago, but not used to full advantage.

(2) Using county prison labor to concrete bottoms of ditches in rural districts.

(3) We are making and have started to use farm tenant home anopheline traps similar to those used at Panama twenty years ago. We believe every infected Anopheles that destroys itself is headed in the right direction. Also we electrocute the typhoid flies and dysentery flies that go wrong and are headed toward our county prison farm dairy building.

(4) Use of electric power in screen door construction.

(5) Offering prizes (as inducements) for increased activity by rural school districts in improving sanitary conditions at farm tenant homes.

(6) Successful and decidedly effective cooperation with the County Home and Farm Agent.

I hope that at an early date some satisfactory means will be devised by the National Malaria Committee whereby our American consular representatives detailed to malarious lands in the Eastern Hemisphere can convey to us all any new procedures in anti-malaria activities that may develop in their territory, so that we may use it in the republics of America. Surely it should be possible for our consular service to take as much interest in this important question as the consular representatives of the southern republics represented here today are doing.

Dr. Victor G. Heiser, New York, N. Y.—As experience throughout the world multiplies, it is becoming increasingly apparent that any one method for malaria control will not fit the widely varying conditions that occur. Probably nothing has caused more disappointment than the application of antilarval measures to

situations for which they were unsuited and the consequent failure to reduce the malaria rate. The control of malaria in temperate and tropical zones in most instances varies very greatly. In our Southern states, for instance, it is necessary, with few exceptions, to apply anti-malaria measures during approximately only six months of the year, whereas in the tropics they usually have to be applied throughout the entire year. The period is not only double, but a situation that continues throughout the year often multiplies by mathematical and sometimes even by geometrical progression. Then again, the tropic downpours of rain create an entirely different set of physical conditions from those we encounter in this climate. This means that antilarval measures that may be very successful here may, at similar costs, fail under tropical conditions.

Another year's travel throughout the tropics of the Eastern Hemisphere has brought convincing evidence that there are many conditions in which anti-larval measures are impracticable, owing to the high cost involved. As long as enormous profits were available from rubber and tin, for instance, it was financially possible for Malaya to carry out anti-larval measures on a huge scale which reduced the malaria incidence. The foregoing emphasizes Mr. LePrince's contention that every community should make every effort to discover or avail itself of suitable knowledge with which to combat its malaria at a cost that is within its means. After his intimate association for a quarter of a century with control measures for malaria, it is easy to understand Mr. LePrince's impatience with the slow progress he reports. On the other hand, there have been tremendous successes, in which he had a large part, and these will go a long way to soften the disappointments. Much of the malaria which still remains is probably of a more difficult character to control than that which has been successfully dealt with in the past, which makes it all the more necessary to focus attention on increased research to meet the problems that still remain unsolved.

It is well always to keep in mind that perhaps much may be learned by studying natural control factors. There are many areas in which malaria is decreasing or is disappearing altogether without any conscious measures being taken to bring about the results. We not only need additional and better control measures at lowered costs, but we also need an enlightened public to support those measures, and in order to achieve that, more and more public health education is necessary.

Dr. L. L. Williams, Jr., Washington, D. C.—Mr. LePrince has brought out a point which is worth emphasizing, namely, the use of convict labor in rural malarial drainage. This has been very successfully applied in Georgia, where Mr. Clarkson has secured the cooperation of county commissioners in twenty-two counties. For almost two years they have been using convict labor in the rural districts for malarial drainage with conspicuous success.

Where sentiment was against the use of convicts for any work other than public roads I have heard the argument advanced that it was illegal to use public funds and public workers to drain private property. When the advantages of extending this type of work to the benefit of all have been sufficiently impressed upon the minds of the governing body, I have seen this argument overcome and convicts used anywhere in the county where malarious problems could be solved with drainage. As a matter of fact, Mr. Clarkson has so well educated his commissioners in this method that they not only have used convict labor for rural malarial drainage, but have become dissatisfied with the slowness of hand work and, in a number of counties, have purchased and are now using drag line dredges for digging larger outlet ditches.

What better use is there to which a criminal might be put? To pay the debt he owes society for his crime by improving the public health is to my mind the highest form of atonement.

Mr. LePrince (closing).—Some of the technical and medical schools of the Eastern universities are giving special courses in malariology and sanitary engineering phases of malaria control, as well as intensive short courses in sanitary engineering subjects. This study is supplemented by practical summer field work study in applied sanitation. As this method of training enables the student better to fit himself for undertaking or directing malaria control campaigns in any warm or tropical country to which he may be later detailed, it occurred to me that our Southern guests might like to know of it. Most of them already know of the somewhat similar wonderful work already supported by and undertaken by the Rockefeller Foundation. The climatic conditions of European countries are not so favorable to the carrying out of similar plans.

In 1927, when the sanitary engineers of the United States Public Health Service heard from the United States Weather Bureau that the Mississippi River would overflow its banks and possibly destroy some of the protection dikes, they gave the matter rapid but careful consideration and decided that the best emergency control measure to apply, to prevent a post-flood period increase of malaria, would be to screen as many of the malaria-infested farm tenant homes of the counties affected by floods as conditions would permit. In 90 days about eight thousand homes were thus protected. It was assumed before the flood occurred that the aftermath of such activity should result in a tremendous advance in screening of tenant homes by land owners and through efforts of full-time county health units. These emergency plans and conclusions have proven to be decidedly sound and have made for a decidedly large annual increase in antimalaria activity in a number of counties. Also, this activity has received most decided financial and other practical and useful support from a large group of American insect cloth screen manufacturers, who are carrying on important investigations leading to reduction of cost of that phase of malaria control.

During this disheartening period of financial depression, the County Commissioners of Shelby County, Tennessee, have deemed it advisable to put in or build "bottom shell concrete lining" in ditches in the malarious rural sections of their County, thus building Anopheles breeding places permanently out of existence, and many other counties of other states could advantageously do similar work right now or attack other problems of rural sanitation. Such work, so far as possible, should be of a permanent nature, and so planned as to lead to its own future and continuous extension. Hundreds of thousands of dollars will be spent in the next six months to help families whose bread winners are temporarily out of employment.

These respectable American citizens do not want any dole, nor do they desire charity. Many of them would cheerfully give their labor to do "their bit" toward permanently improving the rural health conditions of their county in exchange for what food or money is given them.

Should such a common sense plan be adopted, then let us use an adequate amount of forethought in its execution, so that its future value will be continuous.

MALARIA IN MISSISSIPPI AND ADJACENT STATES*

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(1) MALARIA IN MISSISSIPPI

The malaria problem in Mississippi presents practically every aspect of the malaria problem as common to different sections of all the Southern states. Certain portions of the State are intensely malarious and have been so for many years, while other sections are practically free from the disease. This may be illustrated by comparative death rates for the white population during 1928 as follows: for the Delta counties the average death rate was 73 per 100,000 of population. In the adjoining Bluff counties, the rate was 27.6; in the northeastern counties it was 13.9; in the south central counties, 7.9; and in the coastal counties, 1.9. Almost the same result is shown for the negro population, for which I give the rates also for 1928 as follows: Delta counties, 55.4 per 100,000; Bluff counties, 50.8; northeastern counties, 21.5; south central counties, 18.1; and coastal counties, 17.7.

(2) GEOGRAPHICAL DISTRIBUTION OF MALARIA IN MISSISSIPPI

During 1929 and 1930 the reported cases of malaria in different sections of the State underwent the following changes for the white population only. In the Delta counties there was a decline from 10,259 cases to 3,104 cases; in the Bluff counties there was a decline from 7,165 cases to 3,595 cases; in the coastal counties from 508 cases to 450 cases; in the northeastern counties from 22,872 cases to 15,287 cases; and in the central counties from 11,359 cases to 8,918 cases. In the Delta counties between 1920 and 1929 the number of reported cases of malaria declined from 49,214 to 27,222, while in the rest of the state the number of cases declined from 69,162 to 63,823. The Delta counties mortality declined from 366 deaths in 1920 to 128 deaths in 1929, and in the rest of the State the mortality declined from 356 deaths in 1920 to 188 deaths in 1929. The fatality rate on the basis of the cases reported was therefore much higher in the Delta counties than in the rest of the State, where the disease takes on a milder form. The decided fall in 1929 is to a large extent attributed to the drought or absence of heavy rainfall, which in Vicksburg, for example, was 39.62 inches against an average rainfall for a period of years of 51.93 inches.

(3) VARIATIONS IN CASE FATALITY RATES

The normal case fatality rate is estimated at one death in 470 cases, but that must be accepted with reserve, for regardless of many years of reporting, there are reasons for questioning the completeness of the returns for many sections of the State.

Effort is being made to increase the precision with which a diagnosis of malaria is made and the sense in which the term is used. Physicians are encouraged to make greater use of microscopic diagnosis, while a practice has been developed which ties up the work with morbidity reporting. In addition effort is made to ascertain the proportion of malaria diagnoses given in death certificates which had an ante-mortem microscopical confirmation. When this practice began in 1929, it was ascertained that 9.2 per cent of the diagnoses had been confirmed. In 1930 this proportion increased to 19.6 per cent.

The ratio of cases to deaths must vary considerably for different sections of the State according to the local degree of intensity of the infection. In certain sections, the disease undoubtedly runs a very mild course while in other portions reinfections produce many serious cases which in years past, at least, led to cases of hemoglobinuria or blackwater fever in very malignant form, but that type has practically disappeared with progress in medical attention which now is much better than formerly. Something in this respect may be learned from a study of population changes during the last two decades. Bolivar County, for example, which in former years was one of the most heavily infected counties, increased in population from 48,905 in 1910 to 71,051 in 1930; Issaquena County, in the Delta region, shows a decline from 10,560 in 1910 to 5,734 in 1930; Leflor County increased from 38,290 in 1910 to 53,506 in 1930; Sharkey County decreased from 15,694 to 13,877; Simpson County increased from 17,201 to 20,897; and Washington County increased from 48,933 in 1910 to 54,310 in 1930. These population changes are to a large extent affected by the decline of the lumber industry in most of the counties and the migration of negro laborers to Northern states.

(4) LOCAL MALARIA CAMPAIGNS

Intensive malaria campaigns have been carried on by the State Board of Health and the Bureau of Malaria Control well deserving of thoughtful consideration on the part of those who agree that no one type of malaria control is suitable for every section infected with the disease. In this connection it may not be out of place to quote the principles of procedure agreed upon by the Malaria Conference held in Geneva in 1928 and summarized in a recent treatise on "Malaria in Russia in Relation to Soil and Climate," by Dr. Friedrich Wolter, as follows:

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*Read before National Malaria Committee (Conference on Malaria), meeting conjointly with Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

†Consulting Statistician.

"(1) In the present state of science the aim of measures for combating malaria should merely be to check it as far as possible as an epidemic disease. Any measures which claim to do more, such as its complete extirpation, can only be justified under special conditions. (2) It is not always necessary to control malaria by a method resting on the knowledge of its transmission by mosquitoes. (3) In every country the measures taken for controlling the disease must be preceded by investigations for determining which method is most suitable for the local conditions. (4) At the present time no one method is to be preferred to all the others in the prophylaxis of malaria."

(5) LOCAL MALARIA SURVEYS

In the 1929 report of the Bureau of Malaria Control of the Mississippi State Board of Health is a review of an anopheline survey of the State by Mr. Manuel Perez, made possible through the cooperation of the International Health Division of the Rockefeller Foundation. The review reads in part as follows:

"In the course of the investigation, *A. quadrimaculatus, A. punctipennis* and *A. crucians* were encountered. The three species are state-wide in their distribution, but show some difference in their relative regional abundance. The former is most common in the physiographical regions (Delta, Bluff), where lakes, ponds and slow-moving streams occur. The second was commonest in the hilly northeastern and southcentral regions, while the latter is most abundant in the southcentral portion of the State. Collections of *quadrimaculatus* were made in all except eight counties.

"It is interesting to note that the distribution of malaria and quadrimaculatus is co-extensive. The susceptibility of this species in the State to both natural and experimental infection has been demonstrated by several workers. Here, as elsewhere in the Southeastern states, *quadrimaculatus* would appear to be responsible for the endemicity of malaria.

"Other students of anophelines have discovered *A. atropos* and *A. barberi* within the limits of the State. Both are of very limited occurrence. It is not unlikely that *A. pseudopunctipennis* is also included in our fauna."

Of interest is a brief review of conditions at Rosedale, located immediately behind the levee on the Mississippi River, concerning which it is said:

"Its situation is against the levee, and at times of high water there is a great deal of seepage into the town, which is inadequately drained. Extremely high water prevailed for unusual periods in 1929, and there was heavy *quadrimaculatus* breeding in drift caught in willows in backwater opposite the town. The available equipment for Paris green dusting was wholly unable to cope with this situation. An unsatisfactory anopheline density developed early in the season and was maintained most of the summer. In preparation for 1930 we are having lanes cut through these willows to permit the free passage of a power boat carrying the high power blower belonging to the Bureau for the more effective distribution of Paris green in this area."

(6) LOCAL MALARIA IN CONTROL ACTIVITIES

The principles of the procedure of the county health unit may be summarized as follows:

(a) The ascertainment of the scope and character of the local malaria problem, particularly through improving malaria morbidity reporting and by making epidemiological use of the data.

(b) The education of children and adults in the facts concerning malaria transmission and prevention.

(c) The promotion of screening and mosquito-proofing of dwellings.

(d) The promotion of minor drainage.

Finally attention may be drawn to private malaria control work as emphasized in the report with reference to the efforts of the Delta and Pine Land Company of Scott (Bolivar County), Mississippi, as follows:

"The Delta and Pine Land Company of Scott (Bolivar County), Mississippi, has gone ahead with a portion of the program recommended to them by Mr. Parker in 1928. Several advisory visits were paid them to ascertain the purpose of the work. From May to September 18 applications for Paris green were made to 12 miles of shore land of Lake Bolivar and 10 miles of ditches. A total of 540 pounds of undiluted Paris green was used, diluted with lime or road dust. The Bureau loaned a high powered motor duster and homelite electric generator for the work of this season on the lake. Oil was applied in the vicinity of the company headquarters at Scott. They were also loaned the equipment possessed by the State Board of Health for the manufacture of screen doors. Five hundred and seventy-two doors were made for 167 tenant houses and were installed. The management professes satisfaction with the results and expresses an intention to continue the work next year."

The reports of the Bureau of Malaria Control have not been published. They are illustrated by interesting maps, diagrams and statistical tables, all of which are essential to the student of the subject. In this respect certain foreign countries are far in advance of the United States, particularly British Malaya and Egypt.

(7) COMPARATIVE MALARIA DEATH RATES

Recalling a statement in 1928 that the white malaria death rate of the Delta region of Mississippi was 73.0 per 100,000, this may be compared with some of the rates given in my address of last year on the trends of the malaria death rate, briefly summarized for the present purpose. The European death rate from malaria, 1921-1927, was given as 3.6 per 100,000, and for non-European countries as 25.3. The rate was as high as 208 per 100,000 for Salvador; 176.7 for Venezuela, 1929; 145.9 for the Republic of Mexico and 128.1 for the Republic of Panama. In Porto Rico it was as high as 113 in 1929-1930, while for Cuba it was only 18.8 for the period 1925-1929.

(8) MALARIA IN ARKANSAS

These rates may be compared or contrasted with available rates for the State of Arkansas. In this State, between 1921 and 1930, the number of reported deaths from malaria has declined from 1,027 to 683, while the

rate per 100,000 of population has declined from 58.1 to 36.8. The details are given in the table following:

DEATHS FROM MALARIA IN THE STATE OF ARKANSAS, 1921-1930. RATES PER 100,000

Year	Population	Deaths	Rate
1921	1,767,098	1,027	58.1
1922	1,777,027	824	46.4
1923	1,786,956	756	42.3
1924	1,796,885	700	39.0
1925	1,706,814	646	35.8
1921-1925	8,934,780	3,953	44.2
1926	1,816,743	695	38.3
1927	1,826,672	844	46.2
1928	1,836,601	876	47.7
1929	1,846,530	667	36.1
1930	1,856,459	683	36.8
1926-1930	9,183,005	3,765	41.0
1921-1930	18,117,785	7,718	42.6

(9) MALARIA IN LOUISIANA

In addition to the foregoing, I give corresponding information for the State of Louisiana for the period 1925-1930. In that State the rate has declined from 13.4 per 100,000 of population in 1925 to 8.5 in 1930.

DEATHS FROM MALARIA IN THE STATE OF LOUISIANA, 1925-1930. RATES PER 100,000

Year	Cases Reported	Deaths	Rate
1925	828	252	13.4
1926	984	211	10.9
1927	2,194	269	13.6
1928	1,789	251	12.4
1929	1,495	206	10.4
1930	1,096	180	8.5

(10) MALARIA IN MISSOURI

Finally for the present purpose, I give the malaria deaths in the State of Missouri, which show an increase for the period 1920-1930 from 112 deaths in 1920 to 125 in 1930. The mortality reached a maximum in 1924 with 183 deaths, followed by the next year with 171 deaths.

DEATHS IN THE STATE OF MISSOURI, 1920-1930

Year	Deaths	Year	Deaths
1920	112	1926	140
1921	151	1927	132
1922	143	1928	151
1923	148	1929	153
1924	183	1930	125
1925	171		

(11) MALARIA IN SOUTHEASTERN MISSOURI

But the returns for Missouri as a state fail to reveal the true nature of the problem, since malaria is practically limited in serious form to a half dozen counties in southeastern Missouri as given in full detail in my paper of last year for the period 1912-1929. The rates there shown are extremely high in some cases, but all show a decided diminution compared with those of twenty years ago. I will review the counties briefly by way of explanation. Butler County shows a reduction in the malaria death rate from 270.5 per 100,000 in 1912 to 59.5 in 1929. Dunklin County shows a reduction from 349.5 per 100,000 in 1912 to 58.9 in 1929; Mississippi County, from 120.1 to 25.6; New Madrid County from 183.1 to 73.3; Pemiscot County from 235.6 to 38.1; Scott County from 132.6 to 28.2; Stoddard County from 222.9 to 50.8. The earlier figures show a fatal incidence of malaria corresponding to the most infectious sections of the globe. I made a statement on some other occasion that the earlier conditions in these counties resembled the worst reported for the West Coast of Africa. No extended reports are available as to malaria control activities in these counties, but it is well known that the chief result is to be attributed to drainage operations on a large scale and the resulting progress in agriculture which after all is one of the most encouraging methods of malaria elimination supported by intelligent malaria control measures at the same time. The extraordinary decline in the fatal incidence of malaria in southeastern Missouri has not attracted the attention which should be given to a study of the factors chiefly responsible for this marked reduction. It certainly is most gratifying to find one of the most fertile regions of the globe gradually being improved in healthfulness to a degree where the insidiousness of malaria is no longer a serious factor to be reckoned with. At the same time it is obvious that much yet remains to be done to rid these counties entirely of malaria, for as shown by the following comparisons for the five-year period ending with 1929 the malaria death rates in all these counties are still extremely high. I give for comparison the average rates for the preceding period of thirteen years ending with 1924:

COMPARATIVE MALARIA DEATH RATES, MISSOURI, 1912-1929. RATES PER 100,000

	Average Rate 1912-1924	Average Rate 1925-1929
Butler County	125.1	73.6
Dunklin County	176.6	57.7
Mississippi County	49.9	51.9
New Madrid County	74.6	53.1
Pemiscot County	103.1	53.2
Scott County	47.2	21.2
Stoddard County	92.8	62.8

(12) DECLINE IN MALARIA DEATHS IN MISSISSIPPI

Returning now to a reconsideration of the situation in Mississippi, I present below a table of the morbidity and mortality rates for the total population, 1914-1930:

MALARIA MORBIDITY AND MORTALITY RATES, STATE OF MISSISSIPPI. RATES PER 100,000

Year	Case Rate	Death Rate	Year	Case Rate	Death Rate	Year	Case Rate	Death Rate
1914	6,516	57.3	1920	6,590	40.3	1926	3,739	21.2
1915	8,569	83.1	1921	6,687	53.1	1927	4,542	21.9
1916	8,855	79.5	1922	5,764	39.2	1928	5,030	26.5
1917	7,848	55.7	1923	5,129	31.2	1929	4,580	15.8
1918	5,903	44.1	1924	4,260	19.5	1930	2,461	13.9
1919	6,281	36.4	1925	3,786	21.6			

Since the returns for the white population are probably more accurate than those for the total population, including a large proportion of negroes, I give the white

rates for the State of Mississippi separately in the next table:

MALARIA MORBIDITY AND MORTALITY RATES, STATE OF MISSISSIPPI. RATES PER 100,000

(White Population Only)

Year	Case Rate	Death Rate	Year	Case Rate	Death Rate	Year	Case Rate	Death Rate
1914	6,220	38.2	1920	6,320	22.7	1926	3,904	13.5
1915	8,850	62.9	1921	6,548	36.9	1927	4,634	13.7
1916	9,280	61.1	1922	5,784	27.9	1928	5,588	17.5
1917	8,340	41.1	1923	5,253	20.9	1929	5,311	12.3
1918	6,010	24.1	1924	4,525	11.0	1930	3,145	10.0
1919	6,240	24.4	1925	3,995	11.5			

Here is evidence of considerable progress in the gradual control of the malaria situation as it concerns both the white and the colored population. The whites are shown to have a somewhat higher rate of case incidence, which is probably the result of better reporting, while the death rates throughout are decidedly higher for the negro population. In 1930, for example, the white death rate from malaria was 10.0 per 100,000, while the negro death rate was 17.8.

(13) INTERNATIONAL MALARIA DEATH RATES

In response to a suggestion from Sir Ronald Ross that I add some serial data for malaria for different localities to my discussion, I give a few returns covering the last ten to twelve years which may be of interest. I give the rates per 100,000 estimated population for the period under review.

MALARIA DEATH RATES IN DIFFERENT LOCALITIES, 1919-1929. RATES PER 100,000 ESTIMATED POPULATION

	INDIA				
Year	Calcutta	Ahmedabad	Bangalore	Bombay	Bareilly
1919	132.5	567.7	55.5	23.1	
1920	143.9	875.2	74.4	26.9	
1921	133.7	839.4	60.5	45.5	25.2
1922	118.9	564.0	66.4	40.4	102.4
1923	117.8	410.7	90.8	33.0	89.8
1924	145.0	595.5	39.5	39.4	95.7
1925	186.7	480.7	47.1	46.1	88.9
1926	155.3	986.0	18.5	49.6	93.1
1927	135.5	1007.9	13.5	28.1	167.8
1928	124.9	1071.2	6.7	22.7	161.9
1929	86.1	1440.5	5.9	16.6	130.1

Year	Kingston, Jamaica	Trinidad & Tobago	San Juan, Porto Rico	Havana, Cuba	U. S. Reg. Area
1919	46.3	262.1	19.9	5.2	3.8
1920	35.0	222.2	27.2	5.4	3.6
1921	52.6	242.2	27.0	6.1	3.6
1922	19.0	225.3	17.1	9.2	3.6
1923	23.4	201.4	9.3	7.5	2.8
1924	40.0	199.2	15.5	4.1	2.5
1925	80.9	206.3	12.7	4.8	2.1
1926	33.1	209.7	20.2	4.2	1.9
1927	29.8	167.1	12.6	2.9	2.7
1928	39.7	218.1	14.7	4.1	3.5
1929	14.5	161.9	10.8	1.4	3.6

The foregoing table exhibits some extraordinary contrasts justifying the conclusion that the malaria problem in intensive malaria centers of the world is yet far from having been solved. At the same time there is convincing evidence of progress in certain sections and localities which cannot be set aside by disconcerting evidence from other sources. Comparing the death rates for certain intensive malaria centers with those of Mississippi and other Southern states at the present time, we may well congratulate our own health departments which are gradually producing results of a gratifying kind. It is, however, regrettable that the most affected area, that of southeastern Missouri, should continue to be neglected, for as a matter of fact we are without any extended illustrated reports of what has happened in this infected region in former years and what is being done on a promising scale at the present time to reduce malaria to more moderate proportions. To visualize the problem, I will recapitulate certain conclusions giving comparative malaria death rates in the order of their importance for Missouri, Arkansas, Mississippi and certain foreign countries.

COMPARATIVE MALARIA DEATH RATES PER 100,000

Ahmedabad, India, 1929	1440.5
Trinidad and Tobago, 1929	161.9
Philippine Islands, 1928	133.8
Bareilly, India, 1929	130.1
Republic of Mexico, 1926-1929	126.9
Calcutta, India, 1929	86.1
Butler County, Missouri, 1925-1929	73.6
Stoddard County, Missouri, 1925-1929	62.8
Dunklin County, Missouri, 1925-1929	57.7
Pemiscot County, Missouri, 1925-1929	53.2
New Madrid County, Missouri, 1925-1929	53.1
Mississippi County, Missouri, 1925-1929	51.9
State of Arkansas, 1926-1930	41.0
Scott County, Missouri, 1925-1929	21.2
Bombay, India, 1929	16.6
Kingston, Jamaica, 1929	14.5
San Juan, Porto Rico, 1929	10.8
Louisiana, 1930	8.5
Bangalore, India, 1929	5.9
U. S. Registration Area, 1929	3.6
Havana, Cuba, 1929	1.4

(14) MALARIA IN MEXICO

As regards the Republic of Mexico, I give the facts in tabular form for the four years 1926-1929 for both sexes combined:

MORTALITY FROM MALARIA IN MEXICO, 1926-1929. RATES PER 100,000

Year	Population	Deaths	Rate
1926	15,050,700	21,692	144.1
1927	15,194,040	20,091	132.2
1928	15,337,380	18,851	122.9
1929	15,480,720	16,859	108.9
1926-1929	61,062,840	77,493	126.9

(15) MALARIA IN THE PHILIPPINE ISLANDS

The preceding table shows a progressive decline in malaria deaths in the Republic of Mexico from 21,692 in 1926 to 16,859 in 1929, and in the rate from 144.1 per 100,000 to 108.9, while the average for the four years was 126.9. To this I add a table showing malaria in the Philippine Islands for the ten years ending

with 1928, giving both the actual deaths and the rates per 100,000 of population:

MORTALITY FROM MALARIA IN THE PHILIPPINE ISLANDS, 1919-1928. RATES PER 100,000

Year	Population	Deaths	Rate
1919	9,478,929	37,726	398.0
1920	9,627,450	29,653	308.0
1921	10,081,267	28,407	281.8
1922	10,547,349	27,100	257.8
1923	11,067,117	24,142	218.1
1924	11,234,415	26,740	232.9
1925	11,401,708	24,329	218.4
1926	11,568,994	24,368	210.6
1927	11,736,286	19,520	166.3
1928	11,903,579	15,925	133.8

Comparing the number of deaths from malaria for the ten years ending with 1918 with the ten years ending with 1928, it appears that during the first decade there were 264,641 deaths against 257,910 during the last decade or 522,551 for the twenty years, suggestive of the great prevalence of the disease regardless of continuous efforts on the part of the health department to bring it under better control. By reviewing the last twenty years it appears that the rate has declined from 473.6 per 100,000 in 1906 to 133.8 in 1928, the lowest rate on record.

(16) CONTROL MEASURES IN THE PHILIPPINE ISLANDS

The various procedures of control measures as followed in the Philippine Islands are described in the annual report of the health department in charge of Dr. Jacobo Fajardo for the year 1928, just issued. In cooperation with the International Health Board, a section of malaria control was created in the Philippine health service in 1926 and control measures have been concentrated upon the use of Paris green eliminating anopheline breeding places. It is said, however, that after two years of field and laboratory observations, it was found that the results were inconclusive as to the effectivity of Paris green control. In some places they are controlling the disease with the use of quinine, and in others with plasmochin compound, leaving the mosquitoes alone.

Summarizing the foregoing observations, it appears that the malaria problem is still far from being systematically attacked by all known agencies in a manner likely to produce far-reaching and permanent results. But progress is being made gradually and the difficulties are being surmounted. No experience in this respect is more convincing than that of the United Fruit Company, to which I made extended reference in my report of last year. According to the annual report of the United Fruit Company just published, malaria per 1,000 employes per annum, admitted to hospitals 1925-1930, has diminished as follows, with a single exception. In the Colombia Division, the rate increased from 95.7 in 1925 to 102.5 in 1930; in the Costa Rica Division, it decreased from 156.8 to 67.02; in the Guatemala Division, from 325.1 to 133.7; in the Panama Division, from 230.4 to 40.2; on the Tela Railroad from 184.5 to 110.4; on the Truxillo Railroad, from 259.5 to 167.0; in the Banes Division, from 522.6 to 15.7; in the Preston Division, from 242.3 to 12.3, while in all the divisions combined the rate decreased from 239 to 84.8. Here, then, is unquestionable evidence of substantial progress illustrating the value of an organized system of thoroughly competent methods of supervision. The more the lessons of the United Fruit Company's experience in the tropics are taken to heart by malaria officers of the southern United States, the more conclusive will be the results of local control measures. The evidence conclusively proves that we are yet far from having reached a position where we can rest content upon past achievements, while the only hope for permanent control lies in the continuity of efforts unremittingly applied to whatever the local problem may be.

In closing this report, I wish to give expression of my profound sorrow at the recent deaths of Dr. W. A. Deeks, Chief Medical Director of the United Fruit Company, Dr. Aristides Agramonte of Cuba, Dr. Oscar Dowling of New Orleans, and Dr. E. G. Williams, Health Officer of Virginia. In the deaths of these four outstanding personalities, the cause of malaria control and control of tropical diseases has sustained an irreparable loss. Gradually the pioneers in malaria control are passing, and it is for the new generation to take the lessons of the past seriously to heart and in this direction no student of malaria can ignore the great work of Sir Ronald Ross and the long list of valuable contributions of that distinguished scientist to the cause of malaria causation, prevention and control.

(17) THE ROSS AWARD FUND OF AMERICA

As a member of the Ross Award Fund of America, I therefore close the discussion with an appeal to all those interested in the ramifications of the malaria problem to lend their aid in making this Fund a contribution to the great work of Sir Ronald Ross, which may be thought of otherwise as the greatest medical achievement of the past generation. Those interested in this Fund which is being raised in this country should communicate with Dr. Robert L. Pitfield, Secretary, Ross Award Fund of America, 5211 Wayne Avenue, Germantown, Pennsylvania.

DISCUSSION (*Abstract*)

Dr. Felix J. Underwood, Jackson, Miss.—From the records of our malariologist, Dr. George E. Riley, trained by Dr. Boyd while he was in Mississippi, I gathered these statistics. In eight months, from January through August, 1931, there were reported in Mississippi 82 deaths which were ascribed to malaria, as against 187 in the same period of 1930. Dr. Hoffman gave it as 188, a discrepancy of one. There were 82 deaths as against 187.

Of these deaths in 1930, 32, or 17.1 per cent. were confirmed by microscopic examinations, while in 1931, of the 82 deaths reported, 19, or 23.3 per cent, were confirmed, and ten physicians have not been heard from yet.

In the same period of 1929, 185 deaths were reported, of which only 6, or 3.2 per cent, were verified.

It appears that some progress is being made in the specific and precise diagnosis of malaria.

For the period considered, the mortality reports indicate a considerable reduction in malaria over 1930. This reduction holds true for each of the physiographic regions of the State and is reflected by the diagnostic laboratory examinations and the statement of practising physicians that the malaria incidence in 1931 is lower than even that of 1930 and perhaps the lowest on record.

The eight diagnostic laboratories examined only 9,196 slides with 790, or 8.6 per cent, positive in 1931, as against 13,293 slides with 1,751, or 13.2 per cent, positive in 1930 during the same period.

The malaria program in Mississippi is executed by, through, and with the full-time county health departments and is directed to the rural problems. It has been developed with a full appreciation of the meager resources and varied responsibilities of these organizations. It is realized that satisfactory results will require continuously sustained effort and support over a number of years. This program was developed and adopted in 1929, and the first two years' operation has demonstrated its workability.

The Delta and Pine Land Company referred to by Dr. Hoffman discontinued its malaria program this year with the statement that it preferred to invest in screens and minor drainage rather than in larvicidal control of mosquitoes.

The minor drainage activities have advanced steadily since 1929. In July, 1930, a second engineer was employed, and recently two additional engineers have been added to the staff. From January 1 to October 31, 1931, 125.83 miles have been surveyed and 42.84 miles of ditches reported installed, draining 4,153.8 acres.

Let me again mention and stress the importance of minor drainage, which makes our major drainage function, for, as Dr. Hoffman has said, drainage operations and the resulting progress in agriculture is one of the most encouraging methods for the control and elimination of malaria, when supported by intelligent malaria control measures at the same time.

In addition to the insertion of a negro version into the Rockefeller Foundation motion picture film, "Malaria," the Division of Malaria Control has developed a plan of cooperation with the State Vocational Board of Education whereby its bulletin on the "Why" and "How" of screening and mosquito-proofing of houses is used as a text in each of the 348 vocational and trade schools of the State.

These vocational students will be taught by practical demonstrations the manufacture and installation of the standard screen doors and methods of mosquito-proofing homes.

The outlook for 1932 is regarded with concern. It is desired to maintain the natural gains of 1930 and 1931, but the low price of cotton and the general economic depression will make it difficult to accomplish.

From January to August the number of deaths in the Delta was for 1930, 78, and for 1931, 40. The rate per 100,000, 18.6 in 1930, and 9.7 in 1931. For the State in 1930, there were 187 deaths, and in 1931, 82. The rate per 100,000 in 1930, 9.3, and 1931, 4.0.

Dr. Hoffman (closing).—I have been familiar with malaria conditions in the South for more than thirty years. Conditions in Mississippi thirty years ago were dreadfully bad, but as Dr. Underwood points out, malaria in Mississippi is slowly becoming a vanishing disease. Mississippi has done excellent work, particularly during recent years, with tendencies in the right direction, provided there is no falling off in public support. Mississippi has been fortunate in state health officers who have always clearly realized the supreme importance of malaria control. To bring about far-reaching results, there must be whole-hearted cooperation between State and local authorities, as well as business corporations, interested in the economic aspect of malaria prevention. It is to be hoped that there will be no curtailment in appropriations, but rather a more liberal extension of public support towards control measures which, generally speaking, rest on sound principles of procedure.

SCREENING IN SHARKEY COUNTY*

By A. K. BARRIER, M.D.,
Rolling Fork, Miss.

The remarkable progress of screening in Sharkey County can be attributed to several things. Probably Dr. Boyd's enthusiasm had as much to do with it as anything else and has made it seem larger to him than it really is.

Sharkey County is situated in the central western part of the State, separated from the Mississippi River by Issaquena County, about twelve miles wide. It runs north and south about forty miles and eastward from Issaquena County about twenty-five miles to the west bank of the Yazoo River. It, with Issaquena County and the northern part of Warren County, lying between the Mississippi and Yazoo Rivers, form a natural reservoir for the high waters from the Mississippi River. It is a level area, devoid of hills, full of lakes, bayous and marshy places suitable for the growth and development of mosquitoes. Very few houses in the County are not within communicable distance of some mosquito breeding places, so we can safely assume that all the inhabitants are constantly exposed to malaria, unless they are mechanically protected.

Our little towns until a few years ago were frequently visited by the more malignant forms of the disease, and even now when the house is not protected by screens, the dread monster intrudes.

I came to Sharkey in 1903. At that time I do not think 5 per cent of the houses in the County were screened. I was appointed part-time health officer in 1913, at a salary of $300.00 per year. I immediately began fighting the mosquito. It had cost the County much life, property and money, and had impeded progress more than all other agencies combined.

I decided then that our only hope was to screen our homes. Of course we could cut down the inci-

*Read before National Malaria Committee (Conference on Malaria), meeting conjointly with Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

dence by drainage, removing the water barrel which was used for a cistern, and destroying the minor breeding places adjacent to the home.

Realizing that education was the sheet anchor of all progress, I began to talk privately and publicly, wherever opportunity afforded, teaching white and black, adults and children that the spread of malaria depended on the human and mosquito cycle, through which the malarial parasite passed, and that if this cycle could be broken the problem would be solved; that the destruction of the mosquito or keeping the human being from coming in contact with mosquitoes would accomplish this, and that proper screening of our homes was the most logical as well as the most sensible thing that could be done. We taught them that there were different varieties of mosquitoes, and that the Anopheles that frequented our homes and made its depredations at night was the only one responsible for malaria, that the mosquito that is in evidence during the day is not responsible for the infection.

During the first year, or 1914, the gospel had been so extensively spread that one merchant told me he had sold more screen wire during that year than in all previous years.

I continued this program with moderate results until after the recession of the flood of 1927, when the Red Cross very generously screened between three and four hundred homes. This had a very wholesome effect on our people. It caused them to stand with outstretched hands beckoning for more he'p. Those whose houses were not screened wondered why they were slighted and wondered how long before the Good Samaritan would return.

After this educational work had shown the benefits of screened homes, Dr. Boyd came along in 1929 or 1930. I told him that I thought the only logical way to decrease the incidence of malaria was by screening our homes, to which he readily consented. Further to impress the negro with the importance of the work, Dr. Boyd let us have a moving picture outfit showing the life and habits of the mosquito, his relation to malaria, proper and improper screening of homes. We carried this moving picture to different communities throughout the County. This seemed to impress the negro very perceptibly.

We were then in a position to approach the planter about the work. We showed him the cost in sickness, loss of time, doctors' bil's and funeral expenses. We proved to him that it costs very little more to screen a home, which was a permanent protection for three or four years from flies as well as mosquitoes, day and night, than to furnish mosquito netting for the beds which would last only one season, which at best protected from mosquitoes only during the sleeping hours and not from malaria at all. We estimated that a home that cost $10.00 to screen would require $7.50 for mosquito netting for the beds. We reminded him that his tenant could give a better day's work after being protected from mosquitoes than when he had them to fight all night, that the screened home would not only protect from malaria, but would protect him ordinarily from typhoid fever and other alimentary diseases. We interested the influential tenants, who went to the planter and requested him to screen their homes. We also suggested that the farmer have the work done and charge to tenant, to be paid for at the end of the year, just as they do when they furnish the bars. This suggestion was very satisfactory to both planter and tenant. Most of the houses were screened on this plan.

In 1930, the State Board of Health made an arrangement with a firm in Jackson to build and deliver the screen door complete at $2.00 per door. This included all hardware and facing for the door. The screening for the windows was bought in the open market. The inspector measured doors and windows and made an estimate of cost. We also secured carpenters, whom we trained, who agreed to erect the doors and put screen on the widows at a stipulated price, 25 cents per door and 10 cents per window, which was better than having it put on by the ordinary plantation carpenter.

The inspector superintended all of the work and none was paid for until o. k.ed by him. In one community where we had a Smith Hughes school we interested the boys and they did a great deal of the work, as a result of which we had more screening in that community than in all the other parts of the County. On account of the work done here the teacher of the class was made "master teacher" by the State Extension Department of the United States Department of Agriculture for the most efficient work done by any Smith Hughes school.

We have proposed to the Smith Hughes Department to erect a small plant at which they will be able to build doors themselves for the adjacent plantations, to which they have agreed.

We started out in 1931 in the face of discouragement. Money was scarce and everybody disheartened. Many said we could do nothing on account of the prevailing financial depression, but we concluded that we needed the work worse than ever, that we were in no condition to cope with disease. The poor man could better afford to pay a small sum for screening than to lose time from sickness, paying doctors' bills, funeral expenses, and so on.

The doors which were made at Jackson did not come to the standard, frequently were made of inferior material. Hence we prevailed upon a local firm to erect the necessary equipment for building doors under our supervision. We have had constructed a much better door which has given entire satisfaction, made by order of the sanitary inspector. After measuring doors and windows of all the houses on the plantation, each door was properly marked so that we could know for what house and which side of the house it belonged.

The firm which was building the doors proposed to finance the work by waiting on the planter for pay

until fall. Of course he selected the men whom he proposed to finance. This encouraged some men to have the work done who probably would not have done it if they had had to pay cash for it. Thus prepared, we could confidently approach the farmer. This work requires salesmanship. It requires tact, common sense, patience and perseverance to sell anything. Dr. Canover, of John Smith University, in one of his annual addresses to the graduating class, advised the young men to spend their vacation with a good salesman and learn the art of meeting people and selling wares. I am sure this would be good advice to the health worker. As a result of our labors in 1930 we measured, built and placed 1,476 new screen doors, renovated or rebuilt 580 old doors and screened 3,570 windows, completing 683 houses. Eighteen farms were 100 per cent screened. In 1931 we measured, built and placed 578 doors, screened 1,392 windows, renovated 257 old doors, comp'eting 275 houses. With the screening that had already been done, three-fifths of the homes in the County are now screened. I am sure that if it had not been for the financial depression we should have been able to screen nearly all of the homes during 1932. On one plantation of 12,000 acres with 612 homes where in 1929, before screening, there were 179 cases of malaria, in 1930, after the screens were finished, there were only 17 cases of malaria and there had been no deaths. This plantation has also been entirely free from typhoid fever.

I wish also to state that the negro appreciates and is taking about as good care of the screens as the average white man. We have had with us since August, 1930, a civil engineer, furnished by the Rockefeller Foundation and the State, whose time has been divided between three counties. He has been doing good work, showing the farmer the best mode of getting rid of ponds, lakes and other small bodies of water, thereby not only benefiting the land, but destroying breeding places for mosquitoes. Some conditions, of which the cost of correction had for years seemed prohibitive, were surveyed and corrected. The following will give an idea of the results of the engineer's labor.

During the period from August, 1930, to August, 1931, 50 surveys have been made, or a total of 121,909 feet; 28,520 feet of ditching has been done, draining and benefiting 421 acres of land at a total cost of $484.00, or an average of $1.15 per acre. There are other ditches now in progress which will be completed before this paper is read.

DISCUSSION (*Abstract*)

Dr. Geo. E. Riley, Jackson, Miss.—Dr. Barrier has very aptly described Sharkey County as a natural reservoir during high water and a low level area full of lakes, bayous, lagoons and marshes during normal times. It thus affords an abundance of mosquitoes, mostly quadrimaculatus, even in the driest years. Its mean elevation is less than 100 feet above sea level. It is in truth the most fertile garden spot of the entire Delta, and yet a great portion of it is practically worthless because of its backwaters. The population of Sharkey County is 13,877. There are three towns, Cary, Rolling Fork, and Anguilla, with a combined population of 1,788.

The general economic depression, of which we have heard so much this year, has been experienced by Sharkey County since the flood of 1927. In 1928 and again in 1929 the backwater was upon this County, and then came the great drought of 1930.

In the face of these conditions, Dr. Barrier said "carry on." At first, no doors could be sold because there was no money. Dr. Barrier and his inspector, Mr. Gatlin, paved the way by interesting a local lumber company in the manufacture of screen doors. They then asked for a list of every person in the County to whom the company would extend credit until fall. With this list, a field ripened by previous education of the people and a salesman-like approach, 835 doors were installed and 275 houses were completely screened. As a result of this credit arrangement, the same lumber company in Washington, an adjacent county, operated under the same plan, and the Washington County Health Department was able to screen 205 houses, using 503 doors. I believe that it was through the possibility of this credit system that the 484 houses and 1,355 doors in these two counties were screened.

Both counties had extensively used the negro version of the Rockefeller Foundation film, "Malaria," the screening, posters, and bulletins of malaria and screening.

The plantation carpenters, as has been said, had proved of very poor quality; therefore, regular carpenters were employed and were paid 10 cents for each window, 20 cents for each door, and 5 cents for each chimney. In many instances a door facing had to be made or remodeled. An additional charge of 20 cents was made for this. The average cost per house, including lumber for door facings and labor, was $10.50.

The subject of screening is being taught in 385 vocational and trade schools of the State. One of the vocational schools in Dr. Barrier's county is now making 150 standard screen doors, which will be sold at $1.55. This is being done by the teacher who was made Master Teacher, not only for his educational work but in a large measure because of the interest manifested in health work and the fact that all his students were immunized against typhoid, smallpox, and diphtheria.

A recent survey of 961 houses in Sharkey County revealed that 618, or 64.3 per cent, were screened.

In regard to the engineering service, I can say that in the 14 months there has been a steady increase in the demand for this service. In one instance where drainage was impossible a marsh area was cleared and a dam built, converting the area into a fish pond which is well stocked with fish.

I should like to call attention to the fact that Dr. Barrier, an inspector, and two nurses serve two counties and carry on a well-rounded program. In the face of conditions that exist in this County and which have existed for four years, I think that Dr. Barrier is to be congratulated for the progress made.

PUBLIC HEALTH A BUSINESS PROPOSITION*

By HENRY W. STANLEY,†
Dallas, Tex.

Chambers of commerce, like many other organizations, have been going through a period of transition. A short decade ago the civic employe who could shout most loudly about only the virtues of his community or city was hailed as a great civic leader. Fortunately, for the community good, the day of the bombastic artist has passed. In his stead stands a man acquainted with facts and the laboratories of science, looking for the good to exploit and the defects to correct.

Ten years ago it would have been impossible for a chamber of commerce representative to have discussed public health, much less such a mooted question as malaria control. His remarks would have been frowned upon at home and his attitude would have been regarded as detrimental to the best interests of the community.

Today, the American Public Health Association not only enjoys the support and cooperation of the greatest of chambers, the Chamber of Commerce of the United States, but is finding opportunity to extend its valued service to hundreds of local chambers through the Health Conservation Contest in which nearly three hundred cities are annually enrol'ed.

Fresh from his conquest of Panama, Mr. J. A. LePrince came to Dallas, Texas, and started the first malaria and mosquito control campaign in 1917. The work was placed under the direction of Mr. H. W. Van Hovenberg, who has since then written a brilliant chapter in sanitary engineering as Chief Sanitary Engineer of the St. Louis and Southwestern Railroad. The going was slow in the early years of the campaign. As results became more noticeable it was made a major project of the City Health Department, a place which, I am happy to say, it still enjoys. Da'las is not only proud of her leadership in finance, commerce and industry, but takes pardonable pride in being among the first of Southern cities to overcome its malaria problem.

A chamber of commerce is composed of a group of alert, progressive business and commercial leaders of a community who have found in it a piece of machinery necessary to the development of commerce and industry. Such a group would, of course, be vitally interested in the saving of dollars as well as the creation of new wealth from farm and factory. I have yet to meet a chamber of commerce that could by the most liberal use of the term be called a humanitarian body.

We have dedicated our services to the promotion of public health because it is good business to do so.

I have been informed through a survey recently made by the University of North Carolina that sickness, illness and death from preventable disease is costing the United States more than a billion dollars annually.

A few weeks ago we were told through a great nation-wide campaign that the annual fire loss amounted to the huge sum of $500,000,000. It should be of first-page importance to us that needless sickness is sacking our resources at the rate of a billion dollars a year, or twice the annual fire loss. This loss reaches down to the average citizen at the rate of $8.30 per capita. My home town is paying out two and a half million dollars a year for the privilege of being sick. For the State of Texas it amounts to nearly $50,000,000 a year. Nor do we enjoy poor health in Texas, either.

We know, too, that when the bread winner is ill from any cause earning power is often curtailed and in some instances stopped entirely, in which case we have a non-producer, which strikes a telling blow at the entire and elaborate system of merchandising.

Our second reason for interesting ourselves in a program of life and health conservation is to maintain the efficiency of the worker. The ever increasing number of industrial accidents, on which organized business must pay a compensation insurance premium, is giving us real concern.

A saw mill accident came to my attention a few weeks ago. The mill is paying a very high premium to protect its employes' payroll. This very high rate is based on the experience of the mill. Last year three men were killed and several more injured in a boiler explosion. The fact-finding committee that attempted to ferret out the reason for the exp'osion reported it was caused by the neglect of the fireman watching his boiler. Going a little further to the company physician, we found the fireman was suffering from malaria. You may draw your own conclusions as to the cause of the accident.

Malaria is a rural disease. Our cities and towns have done a good job of mosquito control and have reduced the malaria rate to a very low figure. In the rural sections of the South malaria still exists as our most impoverishing disease.

From the last census I find that 996,537 people live in the rural sections of the 56 counties that lie within a 100 mile radius of the City of Memphis, Tennessee, in the states of Mississippi, Missouri, Arkansas, and Tennessee. A recent survey in which blood specimens of 4,662 school children were examined indicated that 10.8 per cent were malaria victims. I have no doubt that the actual infection would be much higher. However, taking this for a basis for study, we find that 107,635 people living within 100 miles of Memphis have malaria annually. It has been said that each case represents an economic loss of not less than $25.00, often much more. At the rate of $25.00 per case, the eco-

*Read before National Malaria Committee (Conference on Malaria), meeting conjointly with Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

†Director, Trade Extension Division, Chamber of Commerce.

nomic loss in this instance amounted to $2,680,625.00. This amount was taken from the channels of trade.

In one Mississippi county it is estimated that the malaria loss is equal to one-third of the annual county taxes. These facts, I hope, will serve to give you a glimpse of the tremendous loss this one preventable disease is causing each year . . . and will continue to cause until it is brought under control.

Three decades ago J. A. LePrince and Major W. C. Gorgas and their associates flashed the news to the world that yellow-fever and malaria were preventable. They proceeded without delay to prove their statement in the now historic and romantic campaigns of Havana and the Panama Canal Zone. The United States has just reason for being proud of Mr. LePrince as a citizen of the country, but for his contribution to science and his work in the relief of suffering humanity the world claims him.

As a business proposition we have learned in Dallas, Texas, the largest inland cotton market of the world, that we cannot grow cotton on Main Street, nor does it thrive among our towering skyscrapers. We have therefore interested ourselves in the hitherland. We modestly admit our interest in malaria control for purely commercial reasons. It was my pleasure, while associated with the East Texas Chamber of Commerce, a great regional organization serving 71 counties in Eastern Texas, to cooperate with others in sponsoring a bill that passed the forty-second Texas Legislature and was signed by Governor Ross S. Ster'ing, appropriating $50,000 for the specific purpose of malaria control and empowering the State Department of Health and the United States Public Health Service to launch such a campaign. I am happy to tell you that it is now under way and is showing some very pleasing results. In rural meetings Mr. Chester Adams and his associates in the field are having from 300 to 1,200 farmers night after night attend their meetings to see and hear the story of malaria and its control. Educational work is now under way in perhaps 30 counties, while active screening is being conducted in five of the counties that showed a heavy infection.

The St. Louis and Southwestern Railroad has, in my estimation, paved the way for other commercially minded bodies to fo'low in malaria control. Mr. Daniel Upthegrove, President of the lines, will tell you of the saving of hundreds of thousands of dollars which this work has returned to their stockholders. He will tell you of a happy, contented group of employes, an asset that cannot be measured in dollars and cents. This work is now under the direction of Dallas' first mosquito expert, Mr. H. W. Van Hovenberg.

The cost of operating many railroads in southern countries is unquestionably higher than need be because of ma'aria prevalence. This cost, or malaria charge, must be borne by the ultimate consumer of products shipped overseas. We North Americans, being human, are naturally interested in reduction of cost of what we consume and believe such meetings as this may lead to lowering of costs or reducing the unnecessary malaria tax on products raised in malarious river valleys. Also, the Southern republics, like the Northern ones, are in competition with the Eastern countries and their very cheap labor, and must eliminate all unnecessary malaria expenses. If your countries undertake studies leading to malaria elimination, you will undoubtedly see the value of having as a start small national or state appropriations spread over a period of from two to five years, so the study or demonstration appropriation will not be withdrawn before worthwhile results have been achieved, and so that your business interests may be able to analyze critically what you have accomplished and understand beyond a shadow of doubt how they can reduce their production costs.

May I also express my sincere appreciation of the presence here of our friends from the Latin-American countries. We are indebted to you not only for the inspiration of your zeal in battling tropical diseases, but for your contributions to science in the cure of malaria. We are not unmindful of the fact that it was from the Valley of the Amazon that quinine was brought to the scientific world as the only known specific for the cure of malaria.

By the bonds of cooperation welded in this great enterprise of life and health conservation we hope to we'd even stronger bonds of friendship and goodwill. Your presence here is indeed an inspiration.

From a recent survey made by the Child Labor Committee of New York in certain Southern communities, we learn that 35 per cent of the rural people are sick at some time during the year. They lose an average of 26 days a year from illness. Their medical expenses average $42.99 per person. Mortality rates are very high.

We believe that there is something physically wrong with a man who will stick his arm in a fly wheel or drop hammers on his feet. We urge our industries to have their men examined before they enter employment and further submit to a complete physical examination every six months. Industries which have fo'lowed this rule have found that it pays some very handsome dividends, not only in life conservation but in dollars as well.

Our third interest in public health is for the general public welfare. At great expense the Nation maintains an army and navy for the protection of life and property at home and abroad. For the same reason we urge more attention on the part of organized business to the problem of public health.

The day has passed when it is merely a shame to be the victim of preventable disease. It is criminal.

If I stand on the porch of my home and fire at a cat in the alley and miss the cat and strike my neighbor, killing him, I am guilty of negligent homicide. By the same token, if I allow disease to thrive on my property and spread to the home of my neighbor and assassinate him, I am guilty of the same crime. It might be added that any city, county, state or na-

tion that allows disease to stalk its borders unchecked is likewise criminally liable. I am my brother's keeper!

We have been very careless in the proper valuation of human life. Cattle, hogs and sheep are much more respected than men and women, boys and girls. If foot and mouth disease should break out in a herd of Texas' cattle we would spare no expense to stamp out the dreaded disease that was killing our prized animals. My State, be it said to her shame, spends twice as much protecting the livestock as it does in protecting humanity.

It is not a new idea to set a price on a human individual. In Texas we pay a bounty of $5,000 a head for dead bank robbers. The traffic in slaves, but recently abandoned in civilized communities, reaches back to remote antiquity. Dr. Louis I. Dublin, in his book, "The Money Value of a Man," says:

"It is the cheapness of the slave that made possible the enduring monuments in stone raised by the Pharaohs; it is by leisure secured at the cost of slave labor that Greek philosopher and Roman poet became the authors of that more lasting structure, classical literature. Thus the price of man has played a role of no small importance in history in shaping the world to its present state."

According to Dr. Dublin, we enter life with a known value ranging from five to fifteen thousand dollars. The money value of the individual grows as we grow in years and in earning power.

Our greatest assets are not in our mines, our forests, our rivers and our harbors, but in the men and women who control these assets.

The East Texas Chamber of Commerce, with a membership of 10.000 business men, in the eastern part of Texas, offers the following work program:

(1) A full-time county health unit in every county.

(2) A state-wide malaria control campaign.

(3) The Standard Milk Ordinance in every incorporated town.

(4) Safe water, safe milk and sanitary waste disposal on every farm.

Surely an ambitious program. But business men are interested in nothing less. I often think many of our programs are too small to command the attention they deserve.

We further believe that our goal will be reached with greater dispatch if we concentrate our efforts on one project at a time. At present it is malaria control, which we expect to use as a stepping stone to a full-time health unit.

In closing, may I read a few lines from an editorial by that dean of editorial writers, Mr. Bruce Barton?

"Every once in a while somebody rises up to criticise modern parents for devoting too much time to their children's physicial being. Says such a critic: 'Of course the body is important, but it was given us to be disciplined and put down. To lay so much emphasis on the physical is paganism. Our righteous ancestors disregarded their bodies and paid attention to their souls.' This is all true, and it might be added that by neglecting their bodies in the interest of their souls, they beat us to heaven by an average of twenty years. They matured young, worried much, and died in what we now regard as early middle life."

DISCUSSION (*Abstract*)

Mr. J. A. LePrince, Memphis, Tenn.—Some 15 years ago Dallas undertook an antimalaria campaign, and the large commercial industries located in its suburbs no longer have the expensive labor turnover due to high malaria prevalence which formerly existed and which is even yet a decided bar to progress and development in some other large cities in our Southern states. Soon after Dallas began her campaign Mr. Edwin Gould, a prominent and far-sighted business man of New York City, personally financed preliminary malaria control measures in the territory served by the Cotton Belt Railroad, in which he was interested. This campaign, initiated by Mr. Gould, was so directed and deve'oped by Mr. H. W. Van Hovenberg that several other railroads followed the Cotton Belt Railroad methods in order to increase their annual income. A few years ago this group of railroads were spending more money annually on malaria control activities than the legislatures of all states combined appropriated for use of malaria control by state health departments, and attention is invited to the fact that it is in every way as difficult to obtain an appropriation from a board of directors of a well managed railroad as from a state legislature.

The State Health Officer of Texas, like other big business executives, was not afraid to try out a new method of procedure when adequate forethought indicated it would expedite permanent development of rural sanitation in a large section of his State, as well as create a demand by the commercial interests of the State for well directed full-time county health units.

The Chamber of Commerce of the East Texas counties obtained a State appropriation to be used for a period of 28 consecutive months instead of for twelve months only, and we can safely consider this departure (the time element) as the most important advance in the conquest of malaria yet undertaken by any state.

Most unfortunately, the malaria bill as passed by the Legislature of Texas, contained an itemized budget with unfortunate restricting clauses, which reduced the amount of permanent benefits which may be obtained for each dollar expended. In their efforts to protect State funds the law-making officials did not realize they were making it impossible for the field workers to obtain a maximum of permanent beneficial results for each dollar of the taxpayers' money expended. It is the same mistake that was made twenty-five years ago when a non-medical commission limited the power and scope of action of Dr. Gorgas at Panama.

The campaign now under way in East Texas, leading toward the conquest of malaria, has the continuous support of the Chamber of Commerce of East Texas, whose members fully realize that malaria is the most serious of the impoverishing rural diseases. The progress made to date by the field workers is most decidedly encouraging, and it would in no way surprise me to see numerous chambers of commerce of other states and other countries, in a few years from now,

following the procedure inaugurated by the Chamber of Commerce of East Texas.

The other republics of America as well as ours have serious malaria problems which interfere with their normal development, with railroad operation, with industry development, and with agriculture.

Let us assume that in one of these progressive countries a group of bankers and prominent business men started to develop a plant to manufacture structural steel or some other important industry. If imported skilled labor should be used, then unless the directors of the industry take adequate precautions, it may not be long before the workmen become infected, become inefficient; the operation costs climb out of all proportion to what they should be, skilled labor may have to be temporarily replaced by unskilled labor, accidents will follow and financial difficulty may follow much quicker than is anticipated.

If the commercial interest of the city where I live should ask me how a hundred thousand dollars could be spent to best future advantage, so far as development of the commercial interests and future growth of the city is concerned, I should be very conservative in telling them to find a business man like Mr. Stanley to analyze the business conditions in their market area: To use such a man for a period of four years, pay him $25,000.00 a year if necessary, but have him thoroughly sell each chamber of commerce and the business men of the city and the towns in the city's market trade area the idea that for continuous progress they must have adequate full-time rural health service in the counties of their trade area, and must make the conquest of malaria an accomplished fact.

Dr. J. C. Anderson, Austin, Tex.—Texas enjoys the unique distinction of being the first state in the Union to make a specific twenty-eight months appropriation for malaria control. Following a blood survey of some 25,000 school children which revealed a high rate of infection, a $50,000.00 appropriation was made by the Forty-second Legislature to combat the disease. The United States Public Health Service came forward with both men and money and a joint program was launched in that part of Texas, embracing some seventy-two counties in East Texas, having a high malaria rate. The program is singular in that it has the continuous, generous, and very active support of a commercial organization: the East Texas Chamber of Commerce, whose interest, investigations and efforts were influential in the passage of the malaria bill.

Headquarters for the Malaria Unit were established in the East Texas Chamber of Commerce Building at Longview, Texas. The personnel of the malaria organization includes: a medical director, field director, five sanitary instructors, and a malaria technician.

Four counties were selected in which to start active demonstration work and a sanitary instructor was placed in each. The selection of the counties was influenced by: (1) the malaria incidence in the county, (2) the extent to which the county would cooperate, and (3) a desire to locate the instructors so that they might use the county in which they were doing intensive work as a center and work in a radius to include at least four additional counties in their educational programs. One sanitary instructor was chosen with a knowledge of office and laboratory work.

Various tried and proven measures, including gambusia control, oiling, ditching, and drainage, were used, but since malaria is recognized as a rural problem, stress was placed on screening, experience having shown that it is the quickest and most effective control measure. Also, it is fully recognized by the State Department of Health that screening of homes is of most decided importance in the practical reduction of other insect-borne diseases. Screen factories were built in five counties. These factories are operated by revolving funds supplied by county, local and private interests. The amount of the fund in each county varies from $500.00 to $1,500.00. Orders for screens are taken by the sanitary instructor, the houses measured up and the screens made according to United States Government specifications at the screen factory and then hung under the supervision of the sanitary instructor. The screens are sold at cost to the farmer and he has the privilege of paying for them when his crop is made. The average cost of screening a farm home varies from $10.00 to $12.00. Extensive work has also been done in screening repairs. Holes have been patched, large size mesh painted to decrease the size of the mesh, frames straightened, and openings properly covered to eliminate cracks and crevices.

Through the courtesy of the Cotton Belt Railroad in loaning us its exhibit truck, which is equipped with motion picture machine, phonograph and amplifiers, a series of educational programs are being conducted in the rural districts. The programs are chiefly motion picture films interspersed with some speaking. With this equipment we have already visited sixteen counties and reached approximately 32,000 persons.

Our malaria control unit is receiving splendid cooperation from the county agricultural agents, the State Agricultural Experiment Station, and the Agricultural Agent of the East Texas Chamber of Commerce.

Prior to launching a course of study in malaria in the schools, members of the Malaria Unit met with and addressed the teachers at their annual institutes in twenty-three counties. It is estimated 3,000 teachers attended these institutes.

Permission was given to the State Department of Health to reprint Dr. H. R. Carter's primer, "Malaria: Its Cause and Prevention," for use in the schools. Twenty thousand of these pamphlets were printed and the work of distributing them to the fifth, sixth, seventh and eighth grades in the rural schools is under way. This program has the endorsement of the State Department of Education and the superintendents of schools in the various counties are assisting the sanitary instructors in the personal distribution of the primers. The first distribution will cover 24 counties. Malaria essay contests, three-minute talks, posters, and spelling matches (using words from the primer) have been arranged to stimulate the program.

Malaria exhibits were displayed at five county fairs and one district fair.

Dr. Carter's primer was divided into six lessons, the lessons somewhat condensed and published serially in *Federation News*, the official magazine of the Texas Federation of Women's Clubs. In a personal message to the 60,000 club women reached with this magazine, the State President asked that the lessons be used as a basis of study in the clubs.

The malaria control program made possible by the malaria bill enjoys widespread publicity through the East Texas Chamber of Commerce's magazine, the monthly magazine which is sent to the various chambers of commerce, and the weekly news releases that go to 211 papers in the East Texas area.

An article on malaria was published in the Women's Club magazine each month during the malaria season. One entitled "Reminiscences of a Doctor's Wife," by Mrs. S. A. Collom, President of the Woman's Auxiliary of the Southern Medical Association, was especially interesting.

With a view to getting a laboratory diagnosis of malaria suspects in East Texas and of securing the cooperation of the doctors in the malaria program, a laboratory was established at the Malaria Unit headquarters at Longview. Mailing containers and slides were placed in the hands of the doctors and they were urged to make use of the laboratory facilities. Thirty-eight doctors took advantage of this service.

In addition to the four counties in East Texas where intensive malaria work is being done, Cameron County in South Texas has a full-time worker and one assistant doing malaria control work.

In the extreme southern portion of Southeast Texas we have the same malaria problem that is common to other Southern states where new irrigation projects are being rapidly extended. In this area also *Anopheles albimanus* is present. The problem is being thoroughly investigated so that adequate control measures may be instituted.

Drought relief sanitarians in 19 counties did some screening and are carrying on rather thorough educational programs.

There are eighteen towns in Texas that have full-time mosquito control inspectors or supervisors, 32 towns that have part-time men. Three towns inaugurated control programs this year. In a number of the smaller places where work had lagged on account of lack of supervision it was revived and systematic programs were carried out. It is estimated the total budgets for malaria control by cities and towns in 1931 amounted to $75,000.00.

In 1930 a total of 8,958 cases of malaria were reported to the State Department of Health. Up to October 1, 1931, a total of 5,955 cases were reported. Two hundred twenty-seven deaths from malaria were reported in 1930.

It is worthy of note that the City of Dallas is using unemployment funds to straighten creek channels and for ditching and oiling. The City of Texarkana likewise used a portion of the Will Rogers charity fund for drainage work.

With five counties in Texas carrying on active malaria control demonstration programs; with nineteen drought relief sanitarians stressing educational work, and with thousands of school children knowing the true cause of malaria and how to prevent it, we are optimistic in our belief that the next few years will see a malaria enlightened state.

Dr. Francisco Banda (Consul General of Ecuador), New Orleans, La.—I believe that on this occasion when we discuss malaria control and the means of preventing malaria, credit should be given to the country which gave to the world the medicine to cure malaria, that is the cinchona bark, commonly known as Peruvian bark, which in justice to the country which gave to humanity this alkaloid should be called Ecuadorean bark, since it was first discovered in Ecuador.

The earliest, well-authenticated instance of the medicinal use of the cinchona bark is found in the year 1638, when the Countess of Chinchon (hence the name), the wife of the Governor of Peru, was cured of an attack of fever by its administration. The medicine was sent and recommended in her case by the Corregidor of Loja, a province in southern Ecuador on the Peruvian frontier, and was taken from the barks of trees indigenous to this region and after its curative qualities had been practically experienced by the Corregidor himself eight years earlier. A knowledge of the properties of the curative bark was disseminated throughout Europe by members of the Jesuit brotherhood. Hence it also became generally known as Jesuit's bark. According to another account, this name rose from its value having been first discovered to a Jesuit doing missionary work in Ecuador, who, being prostrated with fever, was cured by the administration of an extract from the cinchona bark given to him by an Ecuadorean Indian. Later, the English scientists, Spruce, Markham and Cross, transplanted cinchona trees from this region to India and started there the scientific cultivation of this valuable tree.

The same thing is true of the potato. It is called "Irish potato," but it came first from Ecuador. Also, the so-called "Panama hats." Most and finest are made in Ecuador, yet they are called "Panamas." Rubber also was first discovered in my country by La Condamine. I want you to tell the world that Ecuador gave to the world the cinchona bark.

Mr. LePrince, Memphis, Tenn.—I have walked many, many miles while in Panama looking for the place where the Panama hat is made and could not find it.

Dr. C. P. Coogle, Memphis, Tenn.—Mr. Stanley's appearance in this body of malaria field workers is of enormous interest to us, principally because he is one of the South's leading professional salesmen.

Salesmanship is a subject that this assembly of public health workers continually collides with. We are not different from other groups of human beings in many respects. It is easy for us to see the layman's fault in its attempt at self-medication to cure malaria. It must be amusing to Mr. Stanley and other professional salesmen to see our self-styled, self-created, self-patterned and self-taught practices of salesmanship.

Salesmanship is one of the fine arts. The fundamental principles of salesmanship are as important as are the fundamental principles for the sculptor or the artist or the musician or any of the geniuses. The natural-born but untrained salesman is as far from being a professional salesman as a crude strong-bodied man is

prepared to engage in professional athletics with only the knowledge of the games he acquired in amateur play.

I sincerely believe professional salesmanship is a subject of major importance to our success, and I am suggesting to Mr. Stanley that he discuss with us during the closing of this fine paper the following five questions:

(1) How can we become better salesmen in our field of work, and finally master salesmen?

(2) Would you define for us the terms: customers and prospective customers in so far as these terms would apply to the general public living in a rural area in which one of us would like to engage in malaria control work?

(3) Will you briefly discuss sales cost as it applies to popularizing malaria control work in both rural and urban areas?

(4) Also discuss for us personal inventory as it applies to the salesmanship of public health?

(5) What are the principal objectives in advertising or propaganda, as we choose to call it?

Mr. Stanley (closing).—With your permission, I shall discuss the five very important questions just raised by Dr. Coogle.

As a layman, vitally interested in the wider development of public health work, I have long felt that some way should be found to sell in a package, acceptable to the public at large, this very interesting and worthwhile commodity we call public health. I would not dare question the scientific facts we have heard here, but I sometimes feel like questioning the manner in which they are given to the public.

(1) In selling, we must first know to whom we are going to sell a given commodity. We must survey carefully their background, their earning power, their cultural background, their needs and the manner in which they are accustomed to buying. This briefly is a study of the market in which we sell. In my State, for example, we have at least five different backgrounds or sounding boards against which we must throw our sales message. For example: the sawmill community of East Texas will differ from the community in the next county that specializes in growing truck crops; while the black land farmer in the heavy cotton-producing belt is still another type. Out on the plains we have the dry land farmer, who cultivates his crops with a tractor, lives in a big house, has a barn twice the size of his house. Down in the Big Bend country we have the large cattle ranches with a real flavor of the old West, where men ride hard and shoot fast. On the Mexican border we meet our neighbors from across the Rio Grande with a dash and beauty of the charm of Old Spain. To succeed, then, in selling a malaria control program to Texas, we must know the people to whom we are speaking.

Our commodity or product, which in the present instance is "Freedom from the most impoverishing disease known," has a quality for which we need never make an excuse.

It then becomes our task to put the commodity in a package that will be acceptable to the market in which we expect to sell. Some sections of the country want a bright-colored package, others are content with less. Some are frankly more interested in quality and full measure than in package. Mr. LePrince, whose busy life has carried him through the Americas, will, I am sure, agree that the sale appeal that will sell malaria control in one section of the country will not work in another section. One man may find that the relief from chills is the important thing for him. Another may be willing to bear any burden if we can bring back the sparkle of youth and vitality to his child. The business man is interested in the saving of dollars and the building of his business enterprise.

(2) It is my conviction that all public health work should be tax-supported. Hence the first prospective customer we have to deal with, Dr. Coogle, is the taxpayer. Straining as we are under the burden of ever-increasing taxation, to say merely that it should be tax-supported and let it stand there is to spell its doom. In an effort to secure the modest appropriation before mentioned for work now under way in Texas, we appealed to the heaviest taxpayers in the State on the appeal that all preventable illness, and malaria in particular, was costing us annually millions of dollars, and that the way to lift this yoke of tax oppression was to spend a few thousand dollars to remove the cause of the heavy tax. The difference between $50,000 for control work and $50,000,000 for neglect was so obvious that letters from no less than 200 of the outstanding business and professional men of the State were filed with the Legislature; then the request for the appropriation was made. In my opinion they were the balance of power that secured the money.

The immediate customer for our commodity is the malarial sufferer, who, it seems to me, should be the easiest of all to sell on the need of protection. I am unwilling to believe that anyone wants to be sick. A life of freedom from disease, a life abundant with all the joy of living, should then be the appeal to reach the farmer whose home should be screened.

In antebellum days, the farm home of the South was the seat of culture, refinement and the joy of life. Our Nation was cradled in a rural atmosphere, our leaders sought the beauty and charm of the rural life. Today, the picture has been reversed. The average farm today is about the most undesirable place to live. Without protection afforded by science in a pure water supply, a screened home free from deadly flies and mosquitoes, and with an ever-embarrassing open toilet, the boys and girls of the farm leave it at the first chance. It is up to us, gentlemen, to bring back the glory that was once the pride of the rural homes. It is a challenge that will fire the blood of every Southerner.

(3) In budgeting our sales cost, we base the percentage upon the number of units sold. For example, on a fixed cost, the more we sell the less per unit it costs us. The same theory will hold in applying the program of public health work. For example, in my home town, we spend, let us say, $10,000 on mosquito control. We have a population of 300,000, which re-

duces the expense, or the cost per person, to the small sum of 3 1/3 cents per capita per year. In another community of 8,000 the sum of $800.00 per year is spent, raising the cost per capita to 10 cents.

If the Malaria Unit working in East Texas at the present time spending $25,000 annually did no more than popularize malaria control work through their educational campaign, reaching 2,500,000 people, it would be worth many times the 1 cent per capita cost.

(4) In the matter of the personal inventory, this as in any other phase of selling, will apply to the "salesman." There are two things that I would like to stress in this connection: first, the mental development of the salesman. It has been said that 5 per cent of the American people do all our thinking, that 10 per cent copy what the five thought, and that 85 per cent have never had an original idea. If this be true, and it no doubt is true, it is clearly our job to do the thinking for our prospects, leading them through the process of selling themselves. The second phase of the personal inventory is the health and vigor of the salesman. I think that every public health worker should be a walking advertisement for the commodity he sells, practising everything he teaches, even to the doctor taking a little of his own bitter pills now and then.

(5) In selling and advertising, we are playing upon the keyboard of human emotions. The best definition of salesmanship and advertising that I have ever found is "Arousing the emotions of the prospect and causing his will to act, or buy." In days gone by, we sold things. But people do not buy things today; they buy effects. In malaria control we do not sell screen doors, or quinine; we sell health, vigor, and freedom from disease.

I am firmly convinced that malaria control is as much of a problem for commercial interests to consider as it is for sanitarians to consider, and feel sure our visitors from the southern republics will agree with me. The commercial interests with which I am associated feel that the proper way to proceed is to develop a wider demand here in our country for the products of the republics represented here today.

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EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
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NEW JOURNALS IN THE SOUTH

It is said that the physician learns by writing more than by reading, and with this in mind it is a pleasure to welcome two new journals into the group published below the Mason-Dixon line, as signs of a further increase in the educational facilities of this part of the country. The Northern journals of medicine and the allied sciences have long greatly outnumbered Southern publications; and the majority of their pages have naturally been filled by Northern contributors, who are nearer to them. With increasing facilities for publication, Southerners will be still further stimulated to express the results of their studies and research and the observations of extended clinical practices, and they will secure continuous postgraduate instruction from publications which are immediately at hand.

The two new journals are the *Medical Annals of the District of Columbia,* a monthly which began in January of this year, its Editor being Dr. Wallace M. Yater, of Washington, D. C., and Managing Editor, Dr. Coursen B. Conklin, of the same city. It is the official organ of the Medical Society of the District of Columbia, of which Dr. Arthur C. Christie this year is President. The other publication is the *Southern Surgeon,* a quarterly, the first number of which appeared in April. Dr. L. Minor Blackford, of Atlanta, is Editor, and Dr. B. T. Beasley, of Atlanta, Managing Editor. It is the official organ of the Southeastern Surgical Congress, of which Dr. Frank K. Boland, Atlanta, this year is President.

Both journals are excellent in type and formal make-up and their content is well worthy of scientific attention.

DISINFECTION OF MINOR WOUNDS AND OF THE UNBROKEN SKIN

The household antiseptic for scratches and cuts in the youth of the present generation was probably turpentine, which burned the hurt fingers and injuries from nails in the foot. Later it may have been "Pond's Extract," or hydrogen peroxide, which were less irritating. Later again for many years no mother of small children could travel far without a bottle of tincture of iodine and a brush to paint skin abrasions. Subsequently came the popularity for the last half dozen years or more of mercurochrome, which decorates a wound so that all may see, and remains *in situ* so prominently and so long after the skin has healed that it looks wholly efficient. There has been considerable scientific testimony as to the value of 2 per cent mercurochrome for disinfection of wounds and also for sterilization of the unbroken skin before operations. Through many reports of the antiseptic strength of the drug and through its painlessness in open wounds, it has attained a widespread popularity for external applications. More recently the germicidal potency of the commonly used 2 per cent solution has been questioned.

Dr. J. S. Stevens,[1] of the United States Army, reports a comparison of the relative efficiency of mercurochrome and iodine in skin disinfections. He studied the effectiveness of these two bactericides in destroying various staphylococci, streptococci, gas bacillus, and anthrax on the shaven skins of mice and rabbits. Mercurochrome in 2 to 5 per cent solution in water and in alcohol and acetone, and iodine in 3.5 per cent alcoholic solution and the U.S.P. tincture were used. The 2 per cent aqueous mercurochrome solution failed to destroy the common organisms of the skin. The 2 per cent alcohol

1. Simmons, J. S.: Bactericidal Action of Mercurochrome-220 Soluble and Iodine Solutions in Skin Disinfection. J.A.M.A., 91:704, 1928.

acetone and the 5 per cent alcoholic solutions of mercurochrome were feeble bactericidal agents as compared with iodine. The 3.5 per cent alcoholic iodine was more effective than any concentration of mercurochrome.

Kelser and Mohri,[2] of the Veterinary Laboratory section of the Army Medical School, report similar results in a comparison of the effects of the same two antiseptics on the skin of the horse. Tincture of iodine was superior against all organisms. It was particularly more effective in the destruction of tetanus spores. The Army workers concluded that 2 per cent aqueous mercurochrome is not a satisfactory skin disinfectant in veterinary practice. In addition, they found the germicidal activity of mercurochrome to be decidedly inhibited in the presence of blood serum, tissue exudates and possibly other protein substances.

There are, of course, contrasting reports. Mayes,[3] of Brooklyn, in the last number of the *American Journal of Obstetrics and Gynecology*, advocates a technic of sterilization of the skin and vagina of women with mercurochrome before delivery, and offers charts to show a greatly reduced maternal mortality from puerperal sepsis following this preparation.

In disinfection of the unbroken skin and of small wounds it would seem, however, that mercurochrome cannot be used with complete confidence. Iodine, although strongly bactericidal, is of course quite irritating to many skins.

The majority of minor lacerations in healthy individuals will heal following application of any one of several disinfectants, and also without application of any disinfectant at all. The history of the use of a succession of drugs in different medical eras for the sterilization of minor wounds rather testifies to the efficiency of natural resistance to the ordinary skin contaminants than to the value of any chemical.

For the deeper wounds from contaminated sources, some antiseptic is desirable. Of these two most popular ones, mercurochrome and iodine, the efficiency of the one, mercurochrome, is doubtful; and the other, iodine, is quite irritating.

Osteomyelitis is said to heal if the wound is infected with maggots. With the developing popularity of biologicals, with the obtaining of strong medicaments from urine, pancreas, liver and flies, healing by organic extracts has been greatly encouraged. Tears are said to have a distinctly antiseptic action.[4] Animals have many times successfully treated their own severe wounds by licking them. Perhaps a soothing and bactericidal substance, a perfect antiseptic, remains to be taken from saliva.

2. Kelser, R. A.; and Mohri, R. W.: Comparative Germicidal Tests of Mercurochrome and Tincture of Iodine. Jour. Amer. Vet. Med. Ass'n., 80:87, Jan., 1932.
3. Mayes, H. W.: Maternal Mortality and the Mercurochrome Technic. Amer. Jour. Obst. & Gyn., 23:627, May. 1932.

GLEANINGS FROM RECENT JOURNALS

Best Solution for Proctoclysis.—How to supply fluids to a patient unable to take water by mouth is one of the pressing questions in both medicine and surgery. Many patients who might have survived a major operation have been lost from dehydration; many desperate cases in adults and children have been saved by careful nursing, which means to a very large extent attention to fluid requirements. It is often attempted to supply liquids by rectum to patients who cannot take them by mouth. Nutrient enemata were popular some years ago, but more recently it is realized that the power of food absorption through the colon is very limited.

Because sodium chloride is a common constituent of the diet, and because 0.9 per cent sodium chloride in water has approximately the same osmotic pressure as the blood, this solution has been favored for hypodermoclysis and intravenous injection, and has also been popular for proctoclysis. In 1912, however, it was reported that if tap water is given by Murphy drip through the rectum, more liquid is absorbed than if normal saline is similarly administered. In addition, it has been computed, that if the saline injections were pushed to Murphy's recommendation of 18 pints a day, the patient would absorb 81 grams of salt daily, which is more than the normal intake for a month.[5]

Perusse,[5] of Chicago, has attempted to settle the question of which of the solutions in common use is best absorbed from the lower gut, and which furnishes most nutriment. From a questionnaire he ascertained that the three most popular solutions for proctoclysis were tap water, normal or 0.9 per cent saline, and 5 per cent glucose. Various dissolved substances were

4. Fleming: Proc. Roy. Soc. Biol., 93:306, 1922. Quoted by Howard, H. J.: Offensive and Defensive Reactions in Acute Infections of a Mucous Membrane. Sou. Med. Jour., this issue, p. 602.
5. Perusse, G. L., Jr.: The Solution of Choice in Proctoclysis. Surg., Gyn. & Obst., 54:770, May, 1932.

tried by Perusse on dogs, and subsequently on patients. These included sodium chloride, sodium bicarbonate, and glucose, each in several concentrations, bicarbonate and glucose together, dextrin, tap water, distilled water, peptone, Ringer's solution, and other mixtures. After an operation, the amount of each of these absorbed from the colon in 45 minutes was measured. It was concluded that 1 per cent glucose was the optimum solution for restoring the water balance and supplying some degree of nutrient. If it was combined with 0.5 per cent sodium bicarbonate, there was a lowered rate of absorption, but a greater effect in combating acidosis.

One per cent glucose is of course a markedly hypotonic solution. Glucose in about 8 per cent concentration has more nearly the osmotic pressure of the blood and the 1 per cent would not be advisable for intravenous injections. Dilute glucose, however, tends to pass through the bowel wall after proctoclysis to flow into the more concentrated salt solutions in the tissues, and there to be retained.

This quite elaborate attempt at accurate estimation of the best means of rectal administration of water is worth the consideration of those who have the care of acutely ill patients.

Basophilic Hyperpituitarism.—Harvey Cushing,[6] famous for his studies on acromegaly, has produced evidence differentiating a syndrome caused by another type of tumor of the anterior pituitary gland.

Two hormones of the anterior pituitary are now recognized, says Cushing. One is the growth-promoting hormone which, in excess, induces the well described symptoms of acromegaly, or gigantism. Tumors of the acidophil cells of the anterior pituitary result in acromegaly. The other hormone of the anterior hypophysis is the sex maturing hormone, the hormone which stimulates the ovaries to mature and produce follicles and the testes to spermatogenesis. This hormone is produced by the base-staining cells of the anterior pituitary and its overgrowth, or the presence of an adenoma of the basophilic tissue, results in another hyperpituitary syndrome, which Cushing describes, reporting several cases. Some symptoms of this basophilic pituitary adenoma in women were: painful obesity, hypertrichosis, amenorrhea with overdevelopment of the secondary sex characteristics, and abdominal enlargement. The ovaries were generally found to be senile. The condition was also described in men.

The photographs of the rather young individuals who were shown resembled one's conception of average middle-aged obesity with protruding abdomen, suggesting that perhaps pituitary derangements take a regular part in the aging process and development of the bay window.

Erdheim and Stumme, in 1909, Cushing says, found adenomas in one out of ten of all pituitaries which they sectioned in a series of what were supposed to be normal glands. Adenomas of the endocrines, for example of the thyroid, are functionally very active and a small nodule may cause intense symptoms.

This syndrome of basophilic tumor of the pituitary, Dr. Cushing believes to be as characteristic as that of acromegaly.

Testicle Extract and Tumor Growth.—Development of human cancer occurs chiefly in middle life, when the activity of the ovaries and testicles is diminishing. It is a conceivable hypothesis, though wholly unproved, that the gonads in younger individuals secrete a hormone which tends to impede tumor growth. Some *in vitro* experiments with the transplantable laboratory tumors have been conducted to determine whether incubation *in vitro* with testicle extracts has any effect upon the transplantability of a group of mouse tumors.

Many tissue extracts, when added to culture media, enhance the rate of growth of bacteria and of the infectious viruses. Lanzer,[7] of the Rockefeller Institute, examined several malignant mouse tumors to determine whether they grew in the host more or less rapidly after they had been incubated with watery testicle extracts. Tumors of several grades of malignancy, both slow and swift growing, were used in the inoculations. Upon the very malignant growths, the testicle extract exerted no effect. Upon two growths of a low grade of malignancy, it had a definite inhibiting action; following treatment with the testicle extract the development of the tumors in the new host was obviously retarded.

6. Cushing, Harvey: Basophil Adenomas of the Pituitary Gland and Their Clinical Manifestations. Bull. Johns Hop. Hosp., 50:137, March, 1932.

7. Lanzer, R. C.: Effect of Testicle Extract on the Growth of Transplantable Mouse Tumors. Jour. Exper. Med., 55:455, March, 1932.

The testicle extract was destructive for these tumors after it had been heated to 60 to 100 degrees Centigrade. The growth inhibiting factor was observed to be filter passing and thermostabile.

Testicle extract outside the body was thus destructive to certain slowly developing cancerous tissue. It did not impede invasion by the more malignant growths.

Book Reviews

Pediatrics. The Practical Medicine Series. Comprising eight volumes on the year's progress in Medicine and Surgery. Edited by Isaac A. Abt, M.D., Professor of Pediatrics, Northwestern University Medical School. With the collaboration of Arthur F. Abt, M.D., Assistant in Pediatrics, Northwestern University Medical School. 569 pages with illustrations. Chicago: The Year Book Publishers, 1932. Cloth, $2.25.

A most interesting and valuable symposium on pediatrics. The editors have ably acquitted themselves in amassing a representative collection of pediatric thought. An essential contribution to medical practice.

The Eye, Ear, Nose and Throat. The Practical Medicine Series. Comprising eight volumes on the year's progress in Medicine and Surgery. The Eye. By E. V. L. Brown, M.D., Professor of Ophthalmology, University of Chicago, and Louis Bothman, M.D., Associate Professor of Ophthalmology, University of Chicago. The Ear, Nose and Throat. By George E. Shambaugh, M.D., Professor of Otology, Rhinology and Laryngology, Rush Medical College of the University of Chicago; Elmer W. Hagens, M.D., Instructor in Otology, Rhinology and Laryngology, and Friedberg Fellow in Otolaryngology, Rush Medical College of the University of Chicago. 629 pages with illustrations. Chicago: The Year Book Publishers, 1932. Cloth, $2.50.

Over six hundred abstracts are included in this volume. Foreign fields have been emphasized in collecting the material for this book. Some of the high points are: a report by Gonin of 300 cases of retinal detachment, a new Japanese vaccine for use in tuberculous retinitis, allergy in relation to the middle and internal ear, new ideas in the etiology of glaucoma, sillargettes, electrosurgery of tonsils, mastoiditis and its complications and radium therapy in cancer. The editorial remarks are very pertinent.

Applied Physiology. By Samson Wright, M.D., M.R.C.P., Professor of Physiology, University of London, Middlesex Hospital Medical School. Fourth Edition. 552 pages with tables, charts and illustrations. New York: Oxford University Press, 1931. Cloth, $5.50.

In order to conserve the time of the non-medical student those parts dealing with clinical physiology are indexed in italics. A number of changes have been made in this edition as physiological research has advanced. These changes are more marked in the sections dealing with muscle tone, the active principal of the suprarenal cortex, suprarenalin apnea, regulation of the heart beat, regulation of blood pressure and hypervitaminosis D. The illustrations are of sufficient number and well chosen. The language is especially apt. The book is satisfactory for teaching purposes.

Surgical Pathology of the Diseases of Bones (272 pages with 211 illustrations). *Surgical Pathology of the Genito-Urinary Organs* (286 pages with 222 illustrations). By Arthur E. Hertzler, M.D., Surgeon to the Agnes Hertzler Memorial Hospital, Halstead, Kansas; Professor of Surgery, University of Kansas. Philadelphia: J. B. Lippincott Company, 1931. Cloth, $5.00 each volume.

These two books, one on bone and joint surgery and one on genito-urinary surgery, are reviewed together because of their similar characteristics and appeal. They offer pathology in a very readable form. The classifications are strictly clinical, rather according to the methods of treatment than according to the etiology of the various conditions. Beautiful illustrations from a large practice are shown, of the gross pathology, x-ray appearance and photomicrographs, of a large number of diseases of the supporting tissues of the body in the one volume and of the genito-urinary organs in the other.

Bone diseases are divided broadly into: (1) inflammation, (2) diseases of obscure origin, and (3) diseases of neoplastic origin. Under chronic inflammation are described chronic arthritis, rarefying osteitis, and osteitis fibrosa cystica. Among diseases of unknown origin the author includes rickets and scurvy, although mentioning that they are nutritional deficiency diseases.

The informality of the style and its freedom from technical encumbrance, even when the author deals with the more intricate points of pathology, are shown in, for example, the discussion of Ewing's tumors, endothelioma of bone.

"There are said to be twelve men in the world who understand the Einstein theory of relativity. I do not believe there are so many who understand this group of tumors. The question of the derivation of the tumor cells may be left to the pathologists. Ewing believes they are of endothelial origin. That should settle it. If a mother concludes to name one of her progeny 'Clarence' that is her affair and it is not proper for alley urchins to rechristen him 'Freckles.' Some authors state that these tumors produce no bone and then show pictures illustrating how they do produce bone. Some of the cuts published as Ewing's tumors resemble a cross-section of a peeved porcupine. . . . If some day a relationship is shown between Ewing's tumors and osteitis fibrosa cystica or Paget's disease it is going to put some dissenters in an embarrassing position."

In the chapter on a similar subject, tumors of the kidney, in "Surgical Pathology of the Genito-Urinary Organs," he says:

"A great variety of tumors have been described. Some of them are very rare. It is the usual custom in presenting a classification to ring in every variety of affection that has ever been described. This makes it necessary for every reader to carry a lot of excess baggage. I am listing here the four tumors that every surgeon has seen or may expect to see. The rare diseases are grouped together as such. . . . This is done in order to aid anyone who may encounter one of these rare tumors to secure at once a few essential facts; find a citation of some of the im-

Continued on page 677

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JEFFERSON COUNTY MEDICAL SOCIETY

Birmingham, Alabama

HOST to the SOUTHERN MEDICAL ASSOCIATION, Twenty-Sixth Annual Meeting, November 16-18, 1932

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Women Physicians—Dr. Melson Barfield-Carter
Ladies' Entertainment—Woman's Auxiliary, Mrs. John M. Akin, President; Mrs. Sid W. Collier, Chairman

Continued frim page 675

portant literature and at the same time not burden the mind with an account of things he most likely will never see. As a matter of fact, most of the rare things in kidney oncology are the product of that bane of surgical pathology, the high power lens. So armed one can find almost anything in some of the complex tumors, and, if special regions only are considered, the complexity of classification is limited only by the imagination of the observer.

"If the surgeon comprehends the four chief lesions listed below he is not likely to miss anything of importance and very little of purely scientific interest. These four diseases are as follows: carcinomas, hypernephromas, the teratomas, including sarcomas of infancy, and the tumors of the pelvis of the kidney and ureter."

The bibliographies of both volumes are brief and selected. The text, as may be seen, is free from abstruseness and is highly practical. Both volumes will be welcomed by men in these clinical lines.

Southern Medical News

ALABAMA

The Jefferson County Medical Society, Birmingham, had a "Southern Medical Association Night" for its regular meeting on Monday, April 18, this being a dinner meeting at the Tutwiler Hotel. The principal speaker of the evening was Dr. Lewis J. Moorman, Oklahoma City, Oklahoma, President of the Southern Medical Association. Dr. John D. Sherrill, President of the Jefferson County Medical Society, presided. Dr. James R. Garber, General Chairman for the Southern Medical Association meeting in Birmingham next November, spoke briefly and presented the chairman of each of his subcommittees. Dr. Moorman was introduced by Dr. Cabot Lull.

Dr. Porter Stiles, Birmingham, was elected to membership in the American Bronchoscopic Society at its annual meeting in Atlantic City in May.

At the sixty-fifth annual session of the Medical Association of Alabama held in Mobile in April, Dr. Samuel S. Kirkpatrick, Selma, was elected President, and Dr. Douglas L. Cannon, Montgomery, was reelected Secretary.

Among the out-of-state speakers at the annual meeting of the Medical Association of the State of Alabama at Mobile were Dr. Lewis J. Moorman, Oklahoma City, Oklahoma, President of the Southern Medical Association, and Dr. Edward H. Cary, Dallas, Texas, President-Elect of the American Medical Association.

The Gorgas Medical Society of the School of Medicine, University of Alabama, at its meeting in May, conferred an Honorary Fellowship upon Dr. Andrew C. Ivy, Professor of Physiology and Pharmacology, Northwestern University Medical School, Chicago, at which time Dr. Ivy addressed the Society.

Dr. Lewis J. Moorman, Oklahoma City, Oklahoma, President of the Southern Medical Association and Dean of the School of Medicine University of Oklahoma, addressed the students of the School of Medicine University of Alabama, at the University on Tuesday, April 19, after which he was entertained at luncheon with the Tuscaloosa County Medical Society.

DEATHS

Dr. James Henry Somerville, Jr., Tuscaloosa, aged 49, died suddenly April 19.

Dr. Clifford Goodman Arbery, Anniston, aged 48, died March 9 of heart disease.

Dr. Jesse Elbert Robbins, Birmingham, aged 69, died February 4.

ARKANSAS

At the annual meeting of the Arkansas State Medical Society at Little Rock in April the following officers were elected for the coming year: Dr. L. J. Kosminsky, Texarkana, President-Elect; Dr. S. B. Hinkle, Little Rock, First Vice-President; Dr. Grace Tankersley, Pine Bluff, Second Vice-President; Dr. Charles S. Holt, Fort Smith, Third Vice-President; Dr. R. J. Calcote, Little Rock, Treasurer; and Dr. William R. Bathurst, Little Rock, Secretary.

Dr. V. T. Webb, Little Rock, has succeeded Dr. C. R. Moon as City Health Officer, Dr. Moon having resigned to do postgraduate work in Chicago.

Colonel James D. Fife, United States Army Medical Corps, now stationed at Panama, has been designated commander of the Army and Navy General Hospital at Hot Springs National Park.

The First Councilor District Medical Society held its spring meeting at Walnut Ridge in April.

The Tri-State Medical Society of Louisiana, Arkansas and Texas met in Texarkana, Arkansas-Texas, in March for its twenty-seventh annual session.

Dr. D. R. Hardeman, Jr., formerly of Little Rock, has located in Pine Bluff.

Dr. A. H. Hudgins has moved from Griffithville to Searcy.

DEATHS

Dr. Arden Thomas McKinney, Little Rock, aged 51, died March 17.

Dr. Constant Perkins Wilson, Fort Smith, aged 47, died April 1 of pneumonia.

Dr. Charles Schultus Throgmorton, Brinkley, aged 62, died February 25 of malignancy of the gall-bladder.

DISTRICT OF COLUMBIA

The Medical Society of the District of Columbia held its annual meeting May 4 and 5.

A chapter of the Pan American Medical Association for the District of Columbia was organized recently at a meeting in the Embassy of Mexico with the following chosen as officers: Dr. Hugh S. Cumming, Surgeon General, U. S. Public Health Service, President; Dr. J. M. Puig Casauranc, Ambassador of Mexico, and Dr. Jose G. Lewis, Vice-Presidents; and Aristides A. Moll, Sc.D., Secretary.

Dr. D. L. Borden, Washington, Professor of Surgery at George Washington University School of Medicine, addressed the evening session of the all-day clinic held in Norfolk, Virginia, recently.

The American Association of Physical Anthropologists met in Washington in March.

DEATHS

Dr. Nevin B. Shade, Washington, aged 83, died February 29 in Miami, Florida, of pneumonia.

FLORIDA

Taylor County Medical Society has elected the following officers for the coming year: Dr. J. C. Ellis, President; and Dr. James L. Weeks, Secretary-Treasurer; both of Perry.

The following county societies have "gone over the top" with a 100 per cent payment of membership dues for 1932: Lake, Manatee, Sarasota, St. Johns, Sumter, and Taylor.

Escambia County has established a new county health unit, which became operative March 1, with Dr. Wilber A. McFall, formerly health officer for Charlotte, North Carolina, as the Health Officer for this unit.

Dr. J. H. Pittman, West Palm Beach, has moved his office to the Guaranty Building.

Dr. LeRoy Oetjen has moved from Jacksonville to Leesburg.

The Cancer Clinic of Tampa was recently organized, with Dr. Bundy Allen as Chairman and President of the Clinic.

DEATHS

Dr. Peter Lander Brown, Orlando, aged 92, died February 24.

Dr. Kermit Abjohn Light, Miami, aged 28, son of Dr. Samuel D. W. Light, died at Philadelphia General Hospital, where he was an intern, of pneumonia March 25.

Dr. Thomas Capers Jones, Cross City, aged 53, died March 14 of tuberculosis.

GEORGIA

The eighty-third annual session of the Medical Association of Georgia was held in Savannah May 17-20.

Ben Hill County Medical Society has elected the following officers for 1932: Dr. Ralph Russell, President; Dr. W. P. Coffee, Vice-President; and Dr. L. S. Osborne, Secretary-Treasurer; all of Fitzgerald.

Campbell County Medical Society has elected the following officers for 1932: Dr. W. R. Camp, Fairburn, President; Dr. T. P. Bullard, Palmetto, Vice-President; and Dr. A. J. Green, Union City, Secretary-Treasurer.

Carroll County Medical Society has elected the following officers for 1932: Dr. H. L. Barker, President; Dr. S. F. Scales, Vice-President; and Dr. H. J. Goodwyn, Secretary-Treasurer; all of Carrollton.

Chattooga County Medical Society has elected the following officers for 1932: Dr. F. W. Hall, President; Dr. W. J. Bryant, Vice-President; and Dr. H. D. Brown, Secretary-Treasurer; all of Summerville.

Gordon County Medical Society has elected the following officers for 1932: Dr. W. R. Barnett, President; and Dr. Z. V. Johnston, Secretary-Treasurer; both of Calhoun.

Grady County Medical Society has elected the following officers for 1932: Dr. Eugene Clower, President; and Dr. J. V. Rogers, Secretary-Treasurer; both of Cairo.

Hart County Medical Society has elected the following officers for 1932: Dr. J. I. Jenkins, Bowman, President; Dr. B. C. Teasley, Hartwell, Vice-President; and Dr. A. O. Meredith, Hartwell, Secretary-Treasurer.

Jenkins County Medical Society has elected the following officers for 1932: Dr. M. E. Perkins, President; Dr. H. G. Lee, Vice-President; and Dr. C. Thompson, Secretary-Treasurer; all of Millen.

Laurens County Medical Society has elected the following officers for 1932: Dr. O. H. Cheek, Dublin, President; Dr. T. B. Kea, Adrian, Vice-President; and Dr. Charles L. Hicks, Dublin, Secretary-Treasurer.

Madison County Medical Society has elected the following officers for 1932: Dr. H. G. Banister, Ila, President; Dr. C. H. Bryant, Comer, Vice-President; and Dr. W. D. Gholston, Danielsville, Secretary-Treasurer.

Morgan County Medical Society has elected the following officers for 1932: Dr. D. M. Carter, Madison, President; Dr. W. M. Fambrough, Bostwick, Vice-President; and Dr. W. C. McGeary, Madison, Secretary-Treasurer.

Stephens County Medical Society has elected the following officers for 1932: Dr. W. B. Heller, President; Dr. J. E. D. Isbell, Vice-President; and Dr. C. L. Ayers, Secretary-Treasurer; all of Toccoa.

The Atlanta Eye, Ear, Nose and Throat Society was recently organized with the following Atlanta physicians serving as officers for the current year: Dr. L. C. Rouglin, President; Dr. Zach W. Jackson, Vice-President; and Dr. William O. Martin, Jr., Secretary-Treasurer.

Dr. J. H. Hines, Atlanta, has been elected Superintendent of Medical Service of Grady Hospital, Atlanta.

The Second District Society of the Georgia State Nurses' Association met in Thomasville March 25.

The Academy of Medicine, Atlanta, had as their guest speaker recently Dr. Allan W. Rowe, Boston.

Emory Medical Alumni Clinic Week will be held in June, the clinics being at Grady Hospital.

Dedication exercises were held recently for the New Combined Laboratories of Clinical Pathology at Grady Hospital.

Deaths

Dr. William L. Des Portes, Columbus, aged 62, died March 26.

Dr. Thomas George Sheats, Carrollton, aged 73, died February 13 of pneumonia.

Dr. Gabriel M. Saliba, Savannah, aged 49, died March 21 of heart disease.

Dr. Eugene E. Bragg, Atlanta, aged 54, died March 31.

KENTUCKY

Wayne County Medical Society has elected the following officers for 1932: Dr. E. B. Rice, President; Dr. C. F. Holtegle, Vice-President; and Dr. R. E. Teague, Secretary-Treasurer; all of Monticello.

The annual two weeks course of postgraduate instruction will be held at the University of Louisville School of Medicine the early part of June. The following Louisville physicians will be in charge of arrangements: Dr. Charles Hibbitt, Chairman, Dr. John Wathen and Dr. John Walker Moore.

Dr. Fred W. Caudill and Miss Edna Snyder, both of Hazard, were married in March.

Deaths

Dr. Thomas B. Nichols, Bardstown, aged 72, died March 11 of angina pectoris.

Dr. William Thornton Willis, Louisville, aged 60, died March 3 of heart disease.

Dr. George Llewellyn Howard, Berry, aged 73, died December 18, 1931.

Dr. Clarence John Williamson, Newport, aged 41, died March 7 of pneumonia.

Dr. Robert Lee Bird, Covington, aged 68, died March 7 of heart disease.

LOUISIANA

The Louisiana State Medical Society, which held its fifty-third annual meeting in New Orleans in May, had largely a business meeting, due to the meeting on the same date of the American Medical Association in New Orleans. Dr. Carl A. Weiss, Baton Rouge, was elected President-Elect.

The New Orleans Gastroenterological Society at a recent meeting elected the following officers for the coming year: Dr. A. L. Levin, President; Dr. Herbert L. Weinberger, Vice-President; and Dr. Donovan C. Browne, Secretary-Treasurer.

Other organizations meeting in New Orleans concurrently with the American Medical Association were: The American Heart Association, the American Committee for the Control of Rheumatism, Medical Veterans of the World War, the American Society of Clinical Pathologists, and the Association for the Study of Internal Secretions.

Dr. Rudolph Matas, New Orleans, delivered the Donald C. Balfour Lecture in Surgery at the University of Toronto in April.

Dr. Thomas Benton Sellers, Dr. Alton Ochsner, Dr. Martin T. Van Studdiford, and Dr. Chas. J. Bloom, New Orleans, were guest speakers at the Alabama State Medical Association meeting in Mobile recently.

Resolutions on the death of Dr. J. Birney Guthrie, New Orleans, were adopted by the Orleans Parish Medical Society at a recent meeting.

Deaths

Dr. William H. Morgan, Keatchie, aged 60, died February 27 of carcinoma of the right lung with metastasis to the brain.

Dr. George A. Pennington, Madisonville, aged 59, died March 8 of heart disease.

MARYLAND

Dr. Thomas R. Boggs, Baltimore, Associate Professor of Clinical Medicine at Johns Hopkins University School of Medicine, recently was awarded the decoration of the Purple Heart for services as Chief of Medical Services in the A. E. F. air service. Dr. Boggs is a Colonel in the Reserve Army Medical Corps.

Dr. Eli Kennerly Marshall, Jr., has been appointed to succeed Dr. John J. Abel as Professor of Pharmacology and Experimental Therapeutics at Johns Hopkins University School of Medicine. Dr. Marshall was formerly Professor of Physiology.

Dr. Dean Lewis, Professor of Surgery, Johns Hopkins Medical School, Baltimore, was elected President-Elect of the American Medical Association at its annual meeting in New Orleans in May.

The Baltimore City Health Department has solicited the cooperation of Baltimore industries in an antidiphtheria campaign, which includes the immunization of all children.

Dr. Emily Cumming Hammond and Mr. John Fletcher Wilson, both of Lothian, were married April 9.

Deaths

Dr. Harrison Tongue, Elkridge, aged 84, died February 3.

Dr. James Lee Hopkins, Havre De Grace, aged 59, died March 28 of pneumonia.

Dr. Frederic Beach Jennings, Jr., Baltimore, aged 41, died March 29.

Dr. Charles Hampson Jones, Baltimore, aged 73, died April 11 of heart disease.

Dr. William Hayes Brown, Jefferson, aged 62, died March 23 of Hodgkin's disease.

MISSISSIPPI

At the annual meeting of the Mississippi State Medical Society in Jackson April 12-14 the following officers were elected for the coming year: Dr. J. M. Acker, Jr., Aberdeen, President; Dr. John W. D. Dicks, Natchez, President-Elect; Dr. B. S. Guyton, Oxford, Dr. J. S. Hickman, Philadelphia, and Dr. Riley Burnett, Biloxi, Vice-Presidents; Dr. E. L. Wilkins, Clarksdale, Treasurer; and Dr. T. M. Dye, Clarksdale, reelected Secretary.

The Mississippi State Hospital Association held its annual meeting in April at Jackson.

At the annual staff meeting of the State Baptist Hospital the following officers were elected for the coming year: Dr. H. F. Garrison, President; Dr. D. W. Jones, Vice-President; and Dr. Lawrence W. Long, Secretary; all of Jackson.

Pike County Medical Society has elected the following officers for 1932: Dr. W. O. Biggs, Osyka, President; Dr. M. D. Ratcliff, McComb, Vice-President; and Dr. H. C. Hatcher, McComb, Secretary-Treasurer.

Dr. Robert Foster, Anguilla, Sharkey County, has moved to Illinois.

Dr. J. D. Turner, Tupelo, and Miss Helen Keirle were married March 28. Dr. Turner has moved from Tupelo to Eupora for the practise of medicine.

Continued on page 30

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HORLICK'S, Racine, Wis.

Continued from page 678

Dr. James Grant Thompson and Miss Elizabeth Russell, both of Carthage, were married April 4.

DEATHS

Dr. Eleazor Joseph Cowart, Lyman, aged 56, died March 14.

MISSOURI

The Bates County Medical Society has elected the following officers for 1932: Dr. R. E. Crabtree, President; and Dr. C. W. Luter, Secretary; both of Butler.

Cape Girardeau County Medical Society has elected the following officers for 1932: Dr. W. H. Wescoat, President; and Dr. M. H. Shelby, Secretary; both of Cape Girardeau.

Howell-Oregon-Texas County Medical Society has elected the following officers for 1932: Dr. H. A. Thompson, Lanton, President; and Dr. A. H. Thornburgh, West Plains, Secretary.

Schuyler County Medical Society has elected the following officers for 1932: Dr. Ida M. Nulton, Lancaster, President; Dr. J. H. Keller, Lancaster, Vice-President; and Dr. J. B. Bridges, Downing, Secretary-Treasurer.

Dr. Jacob Geiger, St. Joseph, recently entertained the members of the Buchanan County Medical Society at a dinner in celebration of his sixtieth anniversary in the practise of medicine.

Dr. H. S. Crossen and Dr. W. H. Olmstead, both of St. Louis, were guest speakers at the Arkansas Medical Society meeting in April.

Dr. Robert J. Terry, St. Louis, Professor of Anatomy at Washington University, made an address before the session of the American Association of Physical Anthropologists in Washington recently.

Dr. Paul R. Boren and Miss Helen Gaghagen, both of St. Louis, were married April 9.

DEATHS

Dr. Julius Kangisser, St. Joseph, aged 46, died March 25, following an operation.

Continued on page 32

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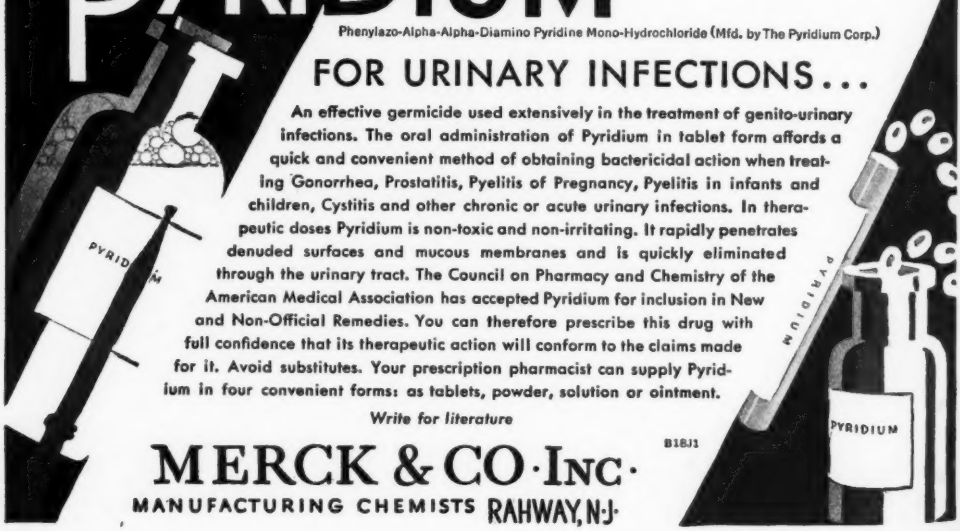
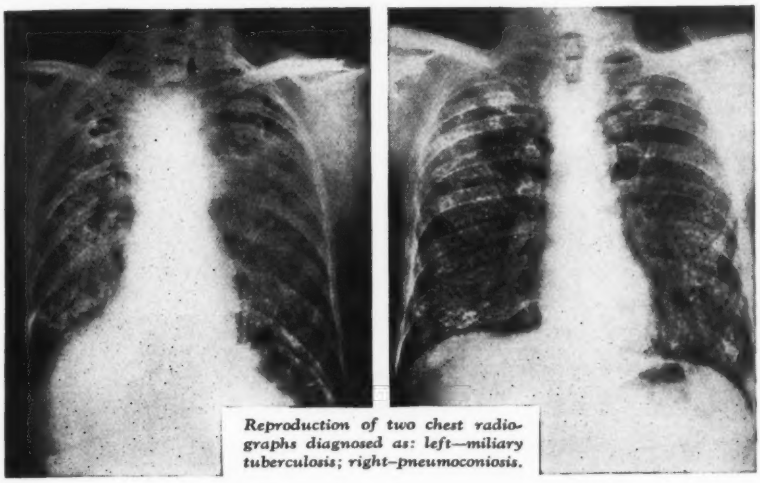


TUBERCULOSIS or PNEUMOCONIOSIS?

Radiographs are invaluable in differentiation



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Continued from page 30

Dr. U. G. Hoshaw, Joplin, aged 62, died April 13 as the result of paralysis.

Dr. Louis J. Wolfort, St. Louis, aged 60, died April 1 of streptococcus cellulitis.

Dr. James Augustine Farrell, St. Louis, aged 40, died March 21 of pneumonia.

Dr. Clyde Weitess Hamlin, Palmyra, aged 49, died March 6 of pneumonia.

Dr. George L. Turner, Monroe City, aged 78, died March 15 in a St. Louis hospital.

Dr. Robert John Thiel, St. Louis, aged 26, died March 22 following an operation for appendicitis.

Dr. Charles N. Williamson, Gentry, aged 59, died March 15 of cerebral hemorrhage.

Dr. Daniel Welles Lippincott, St. Louis, aged 26, died March 26.

Dr. Frederick M. Nufer, St. Louis, aged 60, died March 8.

Dr. Charles Edgar Conrad, Huntsdale, aged 72, died March 1 of tuberculosis.

Dr. Thomas L. Rives, St. Louis, aged 68, died January 10 of carcinoma of the liver.

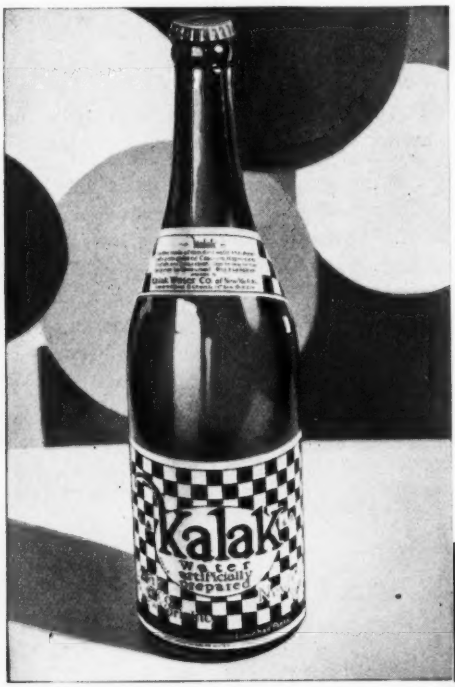
Dr. John Rowan Snell, Kansas City, aged 90, died March 6 of chronic myocarditis.

NORTH CAROLINA

The Medical Society of the State of North Carolina held its annual meeting at Winston-Salem in April with a registration of nearly 750. Dr. John B. Wright, Raleigh, was installed as President for the coming year, and other officers elected for the coming year were: Dr. I. H. Manning, Chapel Hill, President-Elect; Dr. J. R. McCracken, Waynesville, and Dr. W. G. Suiter, Weldon, Vice-Presidents; and Dr. L. B. McBrayer, Southern Pines, reelected Secretary-Treasurer.

The Duke University School of Medicine, Durham, had a clinic on arthritis at the Duke Hospital recently under the direction of Dr. Ralph Pemberton, University of Pennsylvania.

Continued on page 34



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INCORPORATED

BIRMINGHAM, ALABAMA

Continued from page 32

Dr. Warren H. Lewis, Carnegie Institution, Washington, gave a clinic on cancer at the Duke Hospital, Durham, recently.

Dr. William Edward Fitch has located in Burlington, coming from French Lick, Indiana, where he was Medical Director at French Lick Springs.

Dr. Russell Osborne Lyday and Miss Carolyn Bush, both of Greensboro, were married March 24.

Dr. Verne Hamilton Blackwelder and Miss Lillian Mae Broyhill, both of Lenoir, were married April 14.

DEATHS

Dr. Peter McLean, Laurinburg, aged 51, died March 22 of pneumonia.

Dr. Samuel Andrew Grier, Harrisburg, aged 90, died March 18 of pneumonia.

OKLAHOMA

Dr. Lewis J. Moorman, Oklahoma City, President of the Southern Medical Association, addressed the Jefferson County Medical Society, Birmingham, Alabama, on Monday, April 18; the Tuscaloosa County Medical Society at Tuscaloosa, Alabama, and the students of the School of Medicine, University of Alabama, on Tuesday; and the Medical Association of the State of Alabama at its annual meeting in Mobile on Thursday, April 21.

Dr. F. E. Sadler, Norman, is the newly appointed Superintendent of the Soldiers' Relief Hospital at Sulphur. Dr. J. M. Hancock, Chandler, is the Assistant Surgeon.

Dr. E. Levy, of the U. S. Veterans' Hospital, Muskogee, has been transferred to the Bronx Hospital, New York.

Dr. Francis T. Williams, Muskogee, stationed at the U. S. Veterans' Hospital as genito-urologist, has been transferred to the Bronx Hospital, New York City.

Dr. T. J. Dodson has moved from Norman to Foss.

DEATHS

Dr. James Benono Beckett, Spiro, aged 70, died March 10 after a long illness.

Dr. Arthur Lemuel Stocks, Muskogee, aged 59, died March 26 of angina pectoris.

SOUTH CAROLINA

The eighty-fourth annual session of the South Carolina Medical Association was held in April in Columbia. Among the guest speakers on the program were Dr. E. Starr Judd, of the Mayo Clinic, Rochester, Minnesota, and Dr. Harvey B. Stone, of Johns Hopkins Medical School, Baltimore.

DEATHS

Dr. Casper Quinton West, Greenville, aged 63, died March 7 in a local hospital.

TENNESSEE

At the annual meeting of the Tennessee State Medical Association in Memphis in April, the following officers were elected for the coming year: Dr. William P. Wood, Knoxville, President; Dr. Edwin W. Cocke, Bolivar, Dr. William D. Anderson, Chattanooga, and Dr. John T. Moore, Algood, Vice-Presidents; and Dr. Harrison H. Shoulders, Nashville, reelected Secretary. Nashville was chosen as the next meeting place.

Continued on page 36

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Continued from page 34

The West Tennessee Medical and Surgical Association met in Jackson in May.

The Middle Tennessee Medical Society met at Sparta in May.

Dr. Ernest W. Goodpasture, Nashville, Professor of Pathology, Vanderbilt University, recently lectured at the Duke Hospital, Durham, North Carolina.

Dr. Frank James Slemons, Anthras, and Miss Mary Lucy Lewis were married March 26.

Deaths

Dr. J. C. Wilson, Rockwood, aged 63, died March 6.

Dr. W. S. Clack, Chattanooga, aged 55, died March 14 of angina pectoris.

Dr. W. L. Wallace, Knoxville, aged 64, died March 13.

Dr. Allen L. Lear, Sewanee, aged 46, died April 2.

Dr. Thomas B. Snead, Tazewell, aged 62, died February 23 of pneumonia.

Dr. Sylvester W. Thorn, Memphis, aged 57, died February 29 of chronic myocarditis.

Dr. James Floyd Abel, Dayton, aged 74, died January 7 of bronchopneumonia.

Dr. Silas W. Polk, Milan, aged 53, died March 12 of cerebral hemorrhage.

Dr. William Palmer Azariah Smith, Columbia, aged 47, died in February of pulmonary tuberculosis.

Dr. John J. Koger, Rogersville, aged 72, died January 27.

TEXAS

The Texas Surgical Society, at its fourth annual session recently, elected the following officers for the coming year: Dr. A. O. Singleton, Galveston, President; Dr. A. I. Folsom, Dallas, First Vice-President; Dr. Felix P. Miller, El Paso, Second Vice-President; Dr. Elbert Dunlap, Dallas, Treasurer; Dr. Violet Keiller, Houston, Recorder; and Dr. Samuel D. Weaver, Dallas, reelected Secretary.

Bell County Medical Society has elected the following officers for 1932: Dr. M. W. Sherwood, President; Dr. W. J. Graber, Jr., Vice-President; and Dr. R. K. Harlan, Secretary-Treasurer; all of Temple.

Clay County Medical Society has elected the following officers for 1932: Dr. L. F. Crook, Bellevue, President; Dr. E. M. Carman, Vashti, Vice-President; and Dr. Albert Greer, Henrietta, Secretary-Treasurer.

Comal County Medical Society has elected the following officers for 1932: Dr. A. W. O. Bergfeld, President; Dr. H. E. Karbach, Vice-President; and Dr. Bertha Frueholz, Secretary-Treasurer; all of New Braunfels.

Dr. L. A. Barnes and Dr. Ray Black, Huntsville, are in charge of the new Sam Houston Hospital at Huntsville.

Deaths

Dr. Franklin Clark, Iowa Park, aged 71, died November 28, 1931.

Dr. B. O. McLean, Caldwell, aged 72, died January 11 following an operation for ulcer of the stomach.

Dr. Clarence Eugene Drake, San Antonio, Major, U. S. Army, retired, aged 56, died February 29 of acute dilatation of the heart and bronchial asthma.

Dr. John Thomas Watson, Dallas, aged 65, died March 5 of septicemia.

Dr. Laurence Corley, Midway, aged 60, died in March of myocarditis.

Dr. Wilbur Fisk Thomson, Beaumont, aged 58, died February 22 of coronary thrombosis and cholecystitis.

Dr. Hamilton Pope Calmes, San Antonio, aged 41, died March 20 of cirrhosis of the liver.

Dr. John Haley, Irving, aged 65, died February 11 of carcinoma of the jaw.

VIRGINIA

Russell County Medical Society has elected the following officers for the coming year: Dr. T. G. Smith, Lebanon, President; and Dr. W. C. Elliott, Lebanon, Secretary-Treasurer.

The Medical College of Virginia held its ninety-fourth commencement exercises May 28 to 31, at which time the honorary degree of doctor of science was conferred upon General Walter Drew McCaw, U. S. Army, retired, an alumnus of the College.

Dr. Howard R. Masters, Richmond, has been elected President of the local chapter of the Randolph-Macon College Alumni Association, which was recently organized.

Continued on page 38

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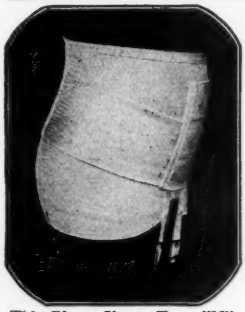

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Continued from page 36

The Tri-State Hospital Conference held its annual meeting in Richmond in May, at which time hospital associations from Virginia, North Carolina and South Carolina were represented.

Dr. Joseph A. White, Richmond, was honored on his eighty-fourth birthday recently by senior and junior students and members of the faculty of the Medical College of Virginia, at which time he addressed this gathering.

Members of the Norfolk County Medical Society recently held an all-day clinic, which was attended by about sixty physicians.

The Medical Society of Virginia is sponsoring a Prenatal and Postnatal Clinic with Dr. Maxwell E. Lapham, Philadelphia, as Clinical Instructor.

Dr. J. Fulmer Bright, Richmond, has been renominated for Mayor, an office he has held for nearly eight years.

Dr. E. R. Moorman has located at Kilmarnock, where he will engage in general practice.

The Northampton County Medical Society met recently at Eastville Inn, Eastville, for their annual banquet.

The National Fraternity of Medical Women will convene at Portland, Oregon, in June, at which time Dr. Pauline Williams, Richmond, National President, will preside.

DEATHS

Dr. Charles Bolton Brock, Richmond, aged 62, died suddenly April 11.

Dr. Thomas J. Stanley, Beaver Dam, aged 67, died April 14.

Dr. Alva Bernard Clarke, Richmond, aged 34, died March 27 as the result of streptococcic infection.

Dr. John A. Tipton, Hillsville, aged 75, died April 23.

Dr. George Grant Howery, Christiansburg, aged 45, died March 8 in a local hospital of pneumonia.

WEST VIRGINIA

Lewis County Medical Society has elected the following officers for 1932: Dr. Cecil Denham, Weston, President; Dr. E. R. Cooper, Troy, Vice-President; and Dr. H. M. Andrew, Weston, Secretary-Treasurer.

Dr. Athey R. Lutz, an alumnus of the Medical College of Virginia, 1927, has located in Huntington, after completing an eighteen months' fellowship at the Willis C. Campbell Clinic in Memphis. Dr. Lutz is connected with the staff of the Huntington Orthopedic Hospital.

Dr. U. W. Massie, formerly of Bluefield, has moved to Montvale, Virginia.

DEATHS

Dr. Edward Winfield Howard, Fairmont, aged 62, died April 16 of angina pectoris.

Dr. E. R. Hatfield, Charleston, aged 59, died April 20 of heart disease.

Dr. O. J. Massey, intern at the Wheeling Hospital, aged 32, died April 21 in an automobile accident.

Dr. William A. Funk, Parkersburg, aged 57, died March 12, following an operation for appendicitis.

Dr. Marine S. Bias, Hurricane, aged 77, died February 19.

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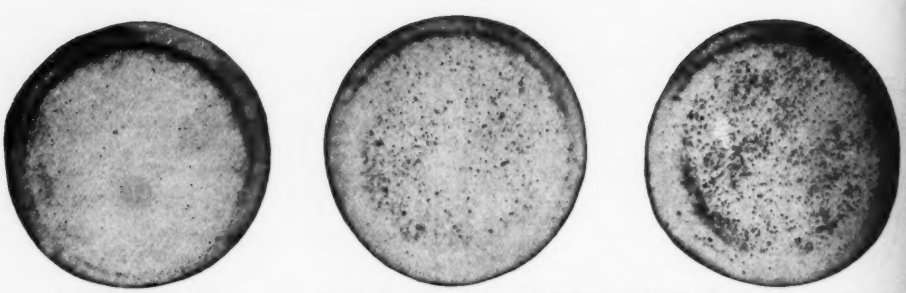

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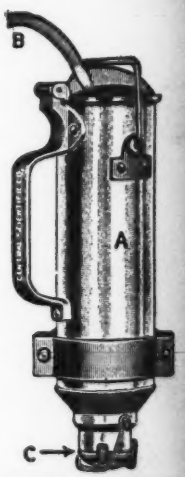

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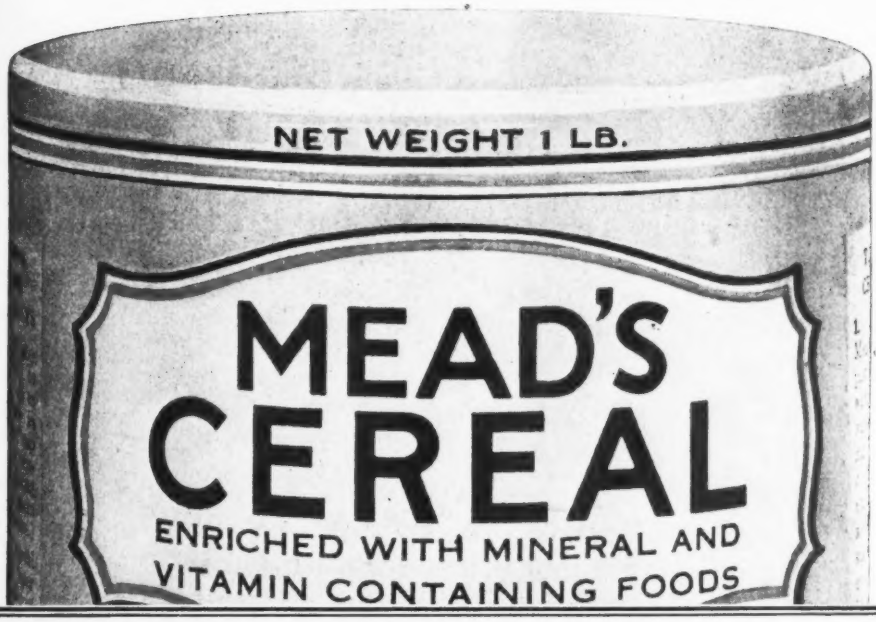

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PARKE-DAVIS TETANUS ANTITOXIN

you get

A clear, sparkling liquid standardized to contain 40% more antitoxic units than stated on the label.

You get a product of small bulk containing a minimum amount of reaction-producing proteins.

Put up in a simple, workable syringe which insures easy administration and perfect asepsis.

Bio. 141.	**1500 units in syringe.**	*(average prophylactic dose)*
Bio. 143.	**5000 units in syringe.**	
Bio. 146.	**10,000 units in syringe.**	*(average therapeutic dose)*
Bio. 149.	**20,000 units in syringe.**	

Parke-Davis biologicals represent the results of many years of painstaking research in biological manufacture.

The surest way to get Parke-Davis quality is to specify, and make sure that you get, Parke-Davis products.

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